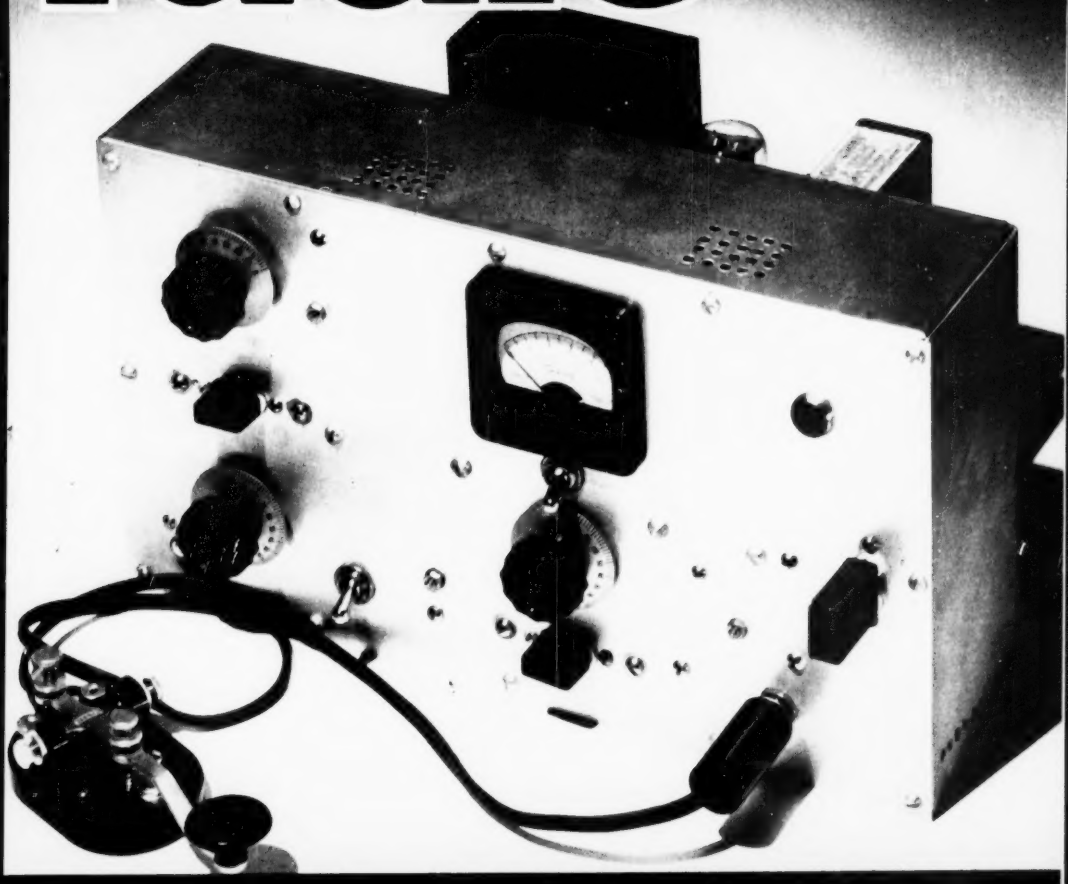
QST

November 1954
40 Cents
45c in Canada

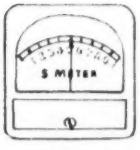
devoted entirely to

amateur radio



PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

A good microphone can improve your results as much as a high gain antenna



Ever notice that two signals of the same "S meter" intensity sound differently? One is muddy, dull, a little hard to read—the sibilant letters like S and F almost alike. The other signal is sharp, clean and readable even in QRM and QRN—because there's usable intelligence. No mistake about the call or comments.

The greatest variation is in the microphone. A sharp peak adds no intelligibility but limits the modulation to that value. A peak of, say 6 db, which is usual in many ordinary microphones, will reduce voice power by HALF. Don't be fooled by a microphone that sounds "louder"—loudness by itself is not a criterion of performance; quite the contrary since it may indicate undesirable peaks.

An E-V microphone with smooth, peak-free response, replacing an inferior instrument, often will do more for a phone signal than a new antenna or increased power. As a further *plus*, of course, you get well-known E-V durability, style and performance. An E-V microphone, to raise stations, to carry through a QSO, is your best station investment.

Shown above are a few of the E-V microphones designed for effective communications. Amateur discount applies.

(upper left) **Model 611** high output dynamic and **Model 911** crystal. On-Off switch. **List from $25.50 to $37.50**

(upper right) **Model 950** Cardax high-level crystal cardioid, with dual frequency response. On-Off switch. **List, $42.50**

(lower left) **Model 630** wide range, high output dynamic, with exclusive Acoustalloy diaphragm. On-Off switch. **List, $47.00**

(center) **Model 636** "Slimair" wide range dynamic. Pop-proof head. Acoustalloy diaphragm. On-Off switch optional. **List, $70.00**

(lower right) **Model 623** slim-type high output dynamic, with E-V Acoustalloy diaphragm. On-Off switch. **List, $49.50.** Also **Model 926** crystal, less switch and connector. **List, $24.50**

(Other E-V microphones for mobile and aircraft communications, telecasting, broadcasting, recording, and public address.)

For further information,
see your E-V Distributor
or write for
Condensed Catalog No. 119

Electro-Voice®

ELECTRO-VOICE, INC. • BUCHANAN, MICH.

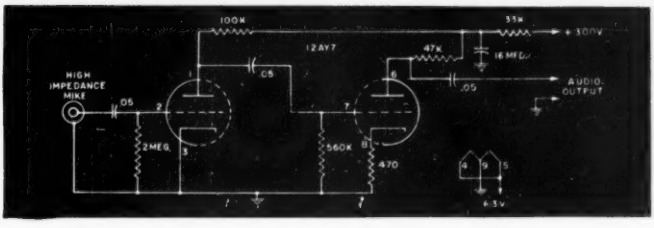
Export: 13 E. 40th St., New York 16, U.S.A. Cables: Arlab

G-E TUBE QUALITY SHOWS IN SUPERIOR DESIGN DETAILS

THEY'RE special, the 4 slots that G.E. puts in the mica spacers of 12AY7 twin triodes. The slots act as barriers to plate-to-grid leakage, which can cause that baneful "egg-frying" noise in audio amplification.

You get a quiet tube in the 12AY7 because G-E designers made sure that every part is engineered for low microphonics. As with all General Electric tubes, 12AY7 high quality isn't merely determined by tests—instead, it starts at the drawing-board, is a product of many G-E design features that join to assure optimum performance.

See the 12AY7 at your G-E tube distributor's! Buy G-E tubes for every ham requirement! You can be sure your needs will be met by efficient types *designed-in-detail* for their jobs! *Tube Department, General Electric Company, Schenectady 5, New York.*



● Low noise level of G.E.'s 12AY7 enables this 2-stage amplifier to boost speech input with a minimum of hum and hiss. Build the device on a turret-type socket . . . it will take up only 1 square inch chassis space!

CQ . . . CQ . . . Have you nominated your Edison Award candidate?

Letters must be postmarked not later than January 3, 1955. If you haven't selected your candidate, please do so soon—then prepare and mail in your nominating letter. Instructions were given on this page in September. Trophy, gift, and national acclaim will go to the amateur who has rendered outstanding public service in 1954!

GENERAL ELECTRIC

166-186

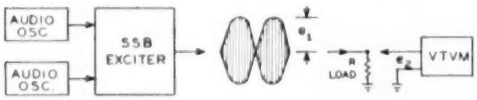
ENGINEERING NOTES

SSB— TRANSMITTER POWER and DISTORTION

While single sideband transmitter power output and distortion have both been discussed previously, the importance of the relationship between the two has not in general been recognized. The reduced bandwidth required by SSB is one of its chief advantages. But distortion in SSB like overmodulation in AM destroys this advantage. The problems involved in SSB distortion should be recognized so that this important advantage is realized in practice.

First, a definition of the transmitter power we are talking about: We have "peak power", "average power", "peak envelope power" and "talk power"— all useable terms if properly defined. The power that an amateur is interested in is the power input to his final amplifier, commonly measured (acceptable to the FCC) by multiplying the plate voltage by the maximum plate current observed on voice peaks, with a plate current meter having a maximum time constant of 0.25 seconds. This power would be called the "peak power input." This method does not give the absolute peak power input since the plate-current meter will not respond fast enough to indicate the current on modulation peaks.

The amateur may also be interested in the power output of the exciter driving his power amplifier. SSB power output is generally referred to as "peak envelope power (P. E. P.)" "Peak envelope power"



has been defined as the RMS power during the maximum RF cycle which occurs in the transmitter. When making the two tone tests, this occurs during the coincidence of the peaks of the two test tones. The diagram shows the transmitter output waveform when making a two-tone test. An oscilloscope will show the peak voltage (e_1) across the transmitter load. A VTVM will read the output voltage. However, most VTVM's are calibrated in RMS volts so that the value (e_2) is 0.707 of the amplitude shown on the scope. Then P.E.P. = $(0.707e_1)^2/R$ if the voltage is measured on a scope, or P.E.P. = $(e_2)^2/R$ if the voltage is measured with a VTVM calibrated in RMS volts.

All amplifier stages have some non-linearity. The degree depends upon such things as DC operating voltages, RF grid-input voltage and plate-voltage swing. With non-linearity, intermodulation distortion is produced. The distortion of an SSB transmitter is considered to be the difference in db between the level of the desired modulating tones and their third order products. For instance, if we were to modulate with two tones of 2000 and 3000 cps respectively, the two third order products would be at 1000 and 4000 cps (obtained from $2f_1$-f_2 and $2f_2$-f_1). A selective receiver such as the 75A-3, with an 800 cps mechanical filter, can be tuned across the spectrum and the level of each of the above signals can be read on the "S" meter. If assuming a transmitted bandwidth of 3100 cps we can see that the 3rd order product of 4000 cps in the above example could interfere with a nearby signal. The difference between the measured levels of the two desired tones, 2000 and 3000 cps, and the undesired 3rd order modulation products, 1000 and 4000 cps, should be at least 25 db in order to minimize the interference. The distortion products can fall on either side of the desired channel and within it. Distortion products such as the 5th, 7th, etc., will also be present but are generally lower than the 3rd order. If the 3rd order products are high, the 5th, 7th, etc., will also be high and the interference created will cover much more of the band.

From the above examples, it can be seen that a linear amplifier can be given considerably different ratings. For instance, an amplifier may be capable of producing 3 watts P.E.P. output with the 3rd order distortion down 30 db. By changing the bias and driving it harder, it may be possible to produce 10 watts output but the 3rd order distortion may be down as little as 6 to 10 db. Obviously, with the second rating the amplifier is producing considerably more distortion and interference.

It is essential then that linear amplifiers be operated conservatively if we are to obtain the maximum improvement possible from an SSB communications circuit

QST

NOVEMBER 1954

VOLUME XXXVIII • NUMBER 11

PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

OFFICES

38 La Salle Road
West Hartford 7, Connecticut

TEL.: AD 3-6268 TWX: HF 88

Subscription rate in United States and Possessions, $4.00 per year, postpaid; $4.25 in the Dominion of Canada, $5.00 in all other countries. Single copies, 40 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

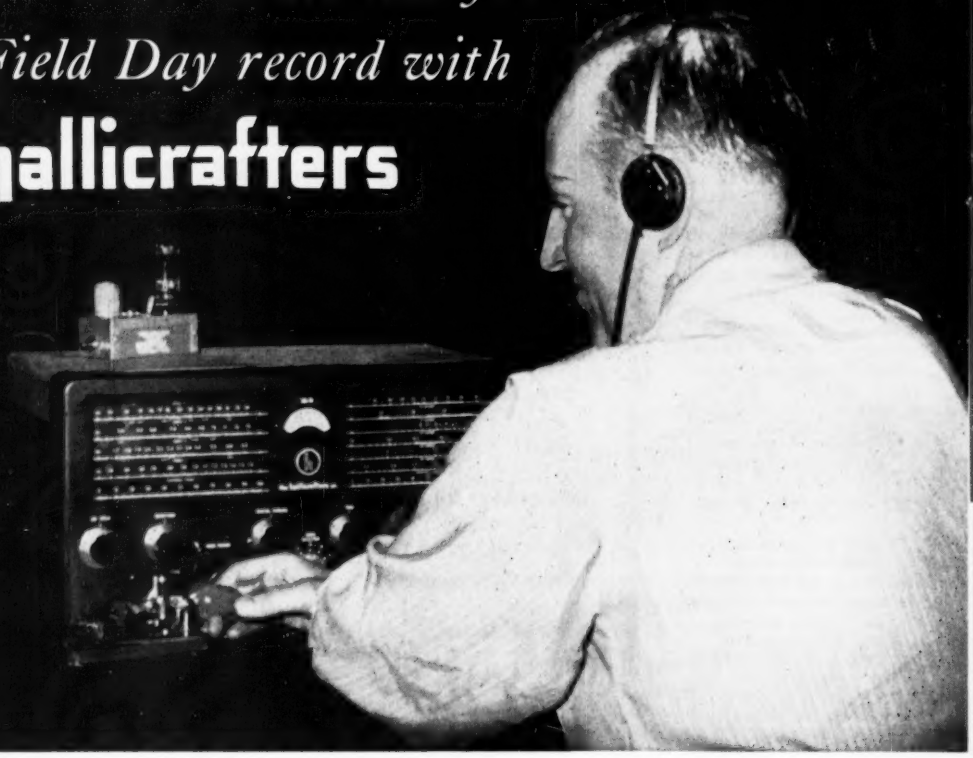
Entered as second-class matter May 29, 1919, at the post office at Hartford, Connecticut, under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1102, Act of October 3, 1917, authorized September 9, 1922. Additional entry at Concord, N. H. authorized February 21, 1929, under the Act of February 28, 1925.

INDEXED BY
INDUSTRIAL ARTS INDEX

Library of Congress Catalog
Card No.: 21-9421

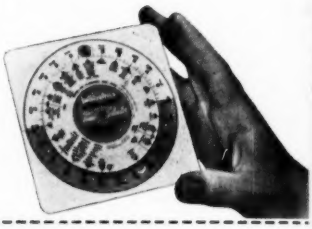
—CONTENTS—

W9WJV beats last year's Field Day record with hallicrafters



Lawrence T. Fadner, team captain in Chicago's 1954 North Suburban Ham Club ARRL 40 meter CW Field Day bettered the club's last record by nearly 30%.

and Hallicrafters SX-88 is hot news too. More hams are telling each other about this new receiver than about any equipment in years.



Used by 33 governments, sold in 89 countries

hallicrafters

CHICAGO 24, ILLINOIS

MAIL THIS COUPON

FREE—Send me World-wide Time Conversion Dial Calculator and all band frequency allocation chart plus a fund of other handy data.

Name_____

Address_____

City_____ State_____

☐ Ham (call letters_____) ☐ Listener

Occupation_____

Hallicrafter equipment I would like to know about:

_____

AIRCRAFT-MARINE
BROADCAST-POLICE
FIXED SERVICES
AMATEUR-DIATHERMY
FREQUENCY STANDARD
MOBILE-INDUSTRIAL

PETERSEN RADIO COMPANY, INC.
2800 W. BROADWAY • COUNCIL BLUFFS, IOWA

EXPORT SALES: Royal National Company, Inc., 75 West Street, New York 6, N. Y., U. S. A.

Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. **ARRL Field Organization station appointments** are available in the areas shown to qualified League members. These include ORS, OES, OPS, OO and OBS. SCMs also desire applications for SEC, EC, RM and PAM where vacancies exist. *All amateurs* in the United States and Canada are invited to join the Amateur Radio Emergency Corps (ask for Form 7).

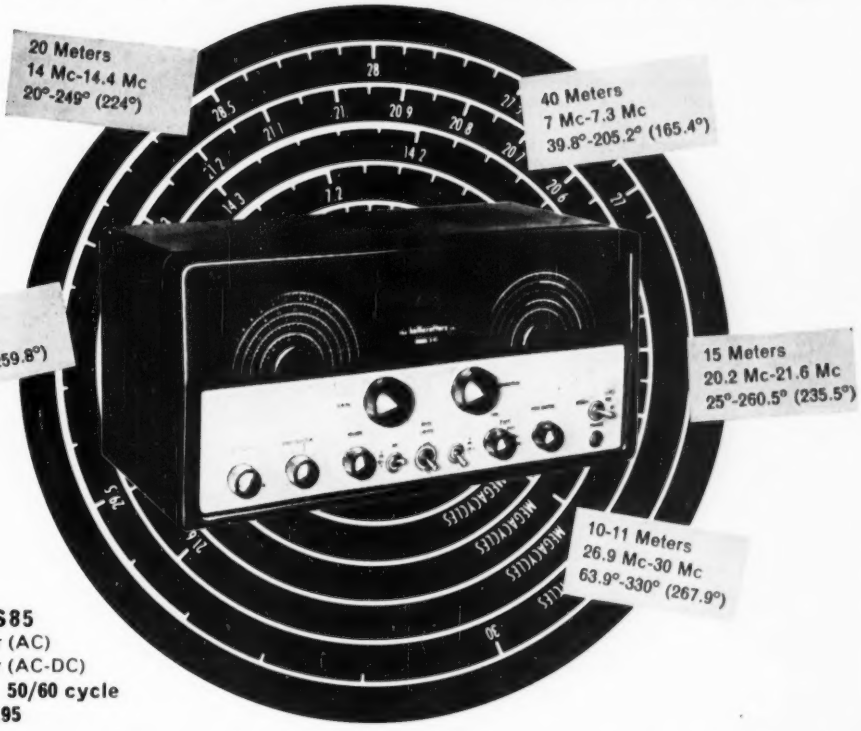
ATLANTIC DIVISION				
Eastern Pennsylvania	W3BIP	W. H. Wiand	R.D 1, Box 300	Gilbertsville
Maryland-Delaware-D. C.	W3EQK	Arthur W. Plummer	3804 Rexmere Road	Baltimore 18, Md.
Southern New Jersey	K2BG	Herbert C. Brooks	800 Lincoln Ave.	Palmyra
Western New York	W2SIV	Edward Graf	81 King St.	Tonawanda
Western Pennsylvania	W3NCD	R. M. Heck	RFD 1	Sharpsville
CENTRAL DIVISION				
Illinois	W9YIX	George Schreiber	219 S. Scoville Ave.	Oak Park
Indiana	W9BKJ	George H. Graue	824 Home Ave.	Fort Wayne 6
Wisconsin	W9RGM	Reno W. Goetsch	929 S. 7th Ave.	Wausau
DAKOTA DIVISION				
North Dakota	WØLNV	Earl Kitkely	P. O. Box 12	Drayton
South Dakota	WØGRN	J. W. Sikorski	1900 South Menlo Ave.	Sioux Falls
Minnesota	WØMXC	Charles M. Bove	1611½ E. Lake St.	Minneapolis 7
DELTA DIVISION				
Arkansas	W5LUX	Fred Ward	520 South Maple St.	Harrison
Louisiana	W5EMO	Thomas J. Morgavi	3421 Beaulieu St.	New Orleans 20
Mississippi	W5OTD	Dr. A. R. Cottese	Box 326	Crystal Springs
Tennessee	W4SCF	Harry C. Simpson	1865 So. Wellington St.	Memphis
GREAT LAKES DIVISION				
Kentucky	W4SBI	Robert E. Fields	541 Central Ave. (Kentucky side)	Williamson, W. Va.
Michigan	W8HKT	Fabian T. McAllister	RFD 1, Box 468	Bridgman
Ohio	W8AJW	John E. Stringer	2972 Clague Rd.	Cleveland 26
HUDSON DIVISION				
Eastern New York	W2ILF	Stephen J. Neason	794 River St.	Troy
N. Y. C. & Long Island	W2VBT	Carleton L. Coleman	P.O. Box 1011	East Hampton, L. I.
Northern New Jersey	W2VQR	Lloyd H. Manamon	410½ Fifth Ave.	Asbury Park
MIDWEST DIVISION				
Iowa	WØUPP	William G. Davis	3rd St.	Mitchellville
Kansas	WØLCV	Earl N. Johnston	624 Roosevelt	Topeka
Missouri	WØGBJ	Clarence L. Arundale	1048 South Jefferson Ave.	Springfield 4
Nebraska	WØCBH	Floyd B. Campbell	203 W. 8th St.	North Platte
NEW ENGLAND DIVISION				
Connecticut	W1EFW	Milton E. Chaffee	53 Homesdale Ave.	Southington
Maine	W1AFT	Bernard Seamon	73 Middle St.	Wiscasset
Eastern Massachusetts	W1ALP	Frank L. Baker, jr.	91 Atlantic St.	North Quincy 71
Western Massachusetts	W1JVH	Roger E. Corey	67 West Allen Ridge Road	Springfield
New Hampshire	W1GMH	Carroll A. Currier	1531 Belmont St.	Manchester
Rhode Island	W1JBB	Merrill D. Randall	52 Bungalo, Girard Ave.	Newport
Vermont	W1RNA	Robert L. Scott	108 Stas Ave.	Newport
NORTHWESTERN DIVISION				
Alaska	KL7AGU	Dave A. Fulton	Box 103	Anchorage
Idaho	W7IWU	Alan K. Ross	2105 Irene St.	Boise
Montana	W7CT	Leslie E. Crowter	608 Yellowstone Ave.	Billings
Oregon	W7BUS	John M. Carroll	P. O. Box 706	Pendleton
Washington	W7FIX	Victor S. Gish	511 East 71st St.	Seattle 5
PACIFIC DIVISION				
Hawaii	KH6KS	James E. Keefer	3459 Kahawalu Dr.	Honolulu 17
Nevada	W7JC	Ray L. Warner	539 Birch St.	Boulder City
Santa Clara Valley	W6WGO	R. Paul Tibbs	1946 Harmil Way	San Jose
East Bay	W6RLB	Guy Black	1546 Spruce St.	Berkeley 9
San Francisco	W6GGC	Walter A. Buckley	46 Colonial Way	San Francisco
Sacramento Valley	W6JDN	Harold L. Lucero	1113 Elmore Ave.	Dunsmuir
San Joaquin Valley	W6GIW	Edward L. Bewley	421 East Olive St.	Turlock
ROANOKE DIVISION				
North Carolina	W4DLX	J. O. Geasler	1832 Logie Ave.	Charlotte
South Carolina	W4ANK	L. Hunter Wood	1702 North Rhett Ave.	North Charleston
Virginia	W4KX	John Carl Morgan	Merrimac Lane	Winchester
West Virginia	W8IQQ	Albert H. Hix	1013 Belmont St.	Forest Hills, Charleston 4
ROCKY MOUNTAIN DIVISION				
Colorado	WØCDX	Karl Brueggeman	1945 Kearny St.	Denver
Utah	W7UTM	Floyd L. Hinshaw	165 East 4th, North	Bountiful
Wyoming	W7PKX	Wallace J. Ritter	P. O. Box 797	Sheridan
SOUTHEASTERN DIVISION				
Alabama	W4MT	Joe A. Shannon		Cottondale
Eastern Florida	W4EWZ	John W. Hollister	8809 Springfield Blvd.	Jacksonville
Western Florida	W4MS	Edward J. Collins	1003 E. Blount St.	Pensacola
Georgia	W4NS	George W. Parker	226 Kings Highway	Decatur
West Indies (Cuba-P.R.-V.I.)	KP4DJ	William Werner	563 Ramon Lloyet	Urb. Truman, Rio Piedras, P. R.
Canal Zone	KZ5RM	Roger M. Howe	Box 462	Balboa Heights, C. Z.
SOUTHWESTERN DIVISION				
Los Angeles	W6YVJ	Howard C. Bellman	973 Mayo St.	Los Angeles 42
Arizona	W7LVR	Albert Steinbrecher	RFD 5, Box 800	Tucson
San Diego	W6LRU	Don Stansifer	4427 Pescadero	San Diego 7
Santa Barbara	W6IOX	Vincent J. Haggerty	1017 Indio Muerto St.	Santa Barbara
WEST GULF DIVISION				
Northern Texas	W5JQD	J. Bruce Craig	1706-27th	Lubbock
Oklahoma	W5KSI	Dr. Will G. Crandall	State Veterans Hospital	Sulphur
Southern Texas	W5EJE	Dr. Charles Fermaglich	618 Medical Arts Bldg.	Houston 2
New Mexico	W5ZU	G. Merton Sayre	Box 625	New Mexico Military Institute, Roswell
CANADIAN DIVISION				
Maritime	VE1OM	Douglas C. Johnson	104 Preston St.	Halifax, N. S.
Ontario	VE3IA	G. Eric Farquhar	16 Emerald Crescent	Burlington, Ont.
Quebec	VE2GL	Gordon A. Lynn	R.R. No. 1	Ste. Genevieve de Pierrefonds P. Q.
Alberta	VE6MJ	Sydney T. Jones	10706-87th Ave.	Edmonton, Alta.
British Columbia	VE7JT	Peter McIntyre	981 West 26th Ave.	Vancouver, B. C.
Yukon				
Manitoba	VE4LC	Leonard E. Cuff	286 Rutland St.	St. James
Saskatchewan	VE5HR	Harold R. Horn	1044 King St.	Saskatoon

* Official appointed to act temporarily in the absence of a regular official.

Leading a brand new line . . .

with over 1000°

OF CALIBRATED BANDSPREAD!



MODEL S85
S-85 Receiver (AC)
S-86 Receiver (AC-DC)
105/125 V. 50/60 cycle
Either $119.95

We know you expect the finest from Hallicrafters and you get it with this exciting new receiver. Here at the "World's Largest Hamshack," we are proud of our new models including the S-85 with the 10, 11, 15, 20, 40 and 80 meter amateur bands calibrated over 1000° for superior selectivity. Broadcast band 540-1680 kc and three short-wave bands 1680 kc—34 Mc are displayed on a large easy-to-read dial. Separate bandspread tuning condenser, seven tubes plus rectifier—there's so much more about this new receiver, why not see your Hallicrafters jobber or mail coupon below for complete specification sheet.

hallicrafters
Chicago 24, Illinois

Mail coupon today:
FREE Please check below

Bill Halligan, Jr.

☐ World-wide Time Converter
Specification Sheets ☐ S-85 (S-86) ☐ S-95 (S-94) ☐ S-38D

Name _____

Address _____

City _____ State _____

☐ Ham (call letters _____) ☐ Listener

Occupation _____

THE AMERICAN RADIO RELAY LEAGUE, *INC.*,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at West Hartford, Connecticut.

Past Presidents

HIRAM PERCY MAXIM, W1AW, 1914–1936
EUGENE C. WOODRUFF, W8CMP, 1936–1940
GEORGE W. BAILEY, W2KH, 1940–1952

Officers

President . . . . . GOODWIN L. DOSLAND, WØTSN
Moorhead, Minnesota

First Vice-President . . . . . WAYLAND M. GROVES, W5NW
P.O. Box 586, Odessa, Texas

Vice-President . . . . . FRANCIS E. HANDY, W1BDI
38 La Salle Road, West Hartford, Connecticut

Vice-President . . . . . PERCY C. NOBLE, W1BVR
37 Broad St., Westfield, Massachusetts

Secretary . . . . . A. L. BUDLONG, W1BUD
38 La Salle Road, West Hartford, Connecticut

Treasurer . . . . . DAVID H. HOUGHTON
38 La Salle Road, West Hartford, Connecticut

• • • • •

General Counsel . . . . . PAUL M. SEGAL
816 Connecticut Ave., Washington 6, D.C.

Technical Director . . . . . GEORGE GRAMMER, W1DF
38 La Salle Road, West Hartford, Connecticut

Technical Consultant . . . . . PHILIP S. RAND, W1DBM
Route 58, Redding Ridge, Connecticut

Assistant Secretaries:
JOHN HUNTOON, W1LVQ LEE AURICK, W1RDV
PERRY F. WILLIAMS, W1UED
38 La Salle Road, West Hartford, Connecticut

DIRECTORS

Canada

ALEX REID VE2BE
240 Logan Ave., St. Lambert, P. Q.
Vice-Director: Reginald K. Town VE7AC
2879 Graveley St., Vancouver 6, B. C.

Atlantic Division

GILBERT L. CROSSLEY W3YA
Dept. of E.E., Penna. State University
State College, Pa.
Vice-Director: Charles O. Badgett W3LVF
725 Garden Road, Glenside, Pa.

Central Division

WESLEY E. MARRINER W9AND
844 N. Galena Ave., Dixon 7, Ill.
Vice-Director: Harry M. Matthews W9UQT
Box 1195, Springfield, Ill.

Dakota Division

ALFRED M. GOWAN . . . . . WØPHR
1012 South Willow Ave., Sioux Falls, S. D.
Vice-Director: Forrest Bryant . . . . . WØFDS
6840 Harriet Ave., Minneapolis, Minn.

Delta Division

GEORGE H. STEED W5BUX
1912 Beech St., Pine Bluff, Ark.
Vice-Director: George S. Acton W5BMM
Plain Dealing, La.

Great Lakes Division

JOHN H. BRABB W8SPF
708 Ford Bldg., Detroit 26, Mich.
Vice-Director: Robert L. Davis W8EYE
247 Highland Ave., Salem, Ohio

Hudson Division

GEORGE V. COOKE, JR. W2OBU
88-31 239 St., Bellerose 26, N. Y.
Vice-Director: Thomas J. Ryan, jr. W2NKD
1082 Anna St., Elizabeth 4, N. J.

Midwest Division

WILLIAM J. SCHMIDT . . . . . WØOZN
306 S. Vassar, Wichita, Kansas
Vice-Director: James E. McKim . . . . . WØMVG
1404 S. Tenth, Salina, Kansas

New England Division

PERCY C. NOBLE W1BVR
37 Broad St., Westfield, Mass.
Vice-Director: Frank L. Baker, jr. W1ALP
91 Atlantic St., North Quincy 71, Mass.

Northwestern Division

R. REX ROBERTS W7CPY
837 Park Hill Drive, Billings, Mont.
Vice-Director: Karl W. Weingarten W7BG
3219 N. 24th St., Tacoma 7, Wash.

Pacific Division

RAY H. CORNELL W6JZ
909 Curtis St., Albany 6, Calif.
Vice-Director: Harry M. Engwicht W6HC
770 Chapman, San Jose 26, Calif.

Roanoke Division

P. LANIER ANDERSON, JR. W4MWH
428 Maple Lane, Danville, Va.
Vice-Director: Gus M. Browning W4BPD
135 Broughton St., S. E., Orangeburg, S. C.

Rocky Mountain Division

CLAUDE M. MAER, JR. . . . . WØIC
740 Lafayette St., Denver, Colo.
Vice-Director:

Southeastern Division

JAMES P. BORN, JR. W4ZD
25 First Ave., N.E., Atlanta, Ga.
Vice-Director: Randall E. Smith W4DQA
902 Plaza Court, Orlando, Fla.

Southwestern Division

JOHN R. GRIGGS W6KW
3661 Buckingham Rd., Los Angeles 8, Calif.
Vice-Director: Walter R. Joos W6EKM
1315 N. Overhill Drive, Inglewood 3, Calif.

West Gulf Division

A. DAVID MIDDLETON W5CA
9 Kay Road, Tijeras, N. M.
Vice-Director: Carl C. Drumeller W5EHC
5824 N.W. 58th St., Oklahoma City 12, Okla.

"It Seems to Us..."

STERLING RETIRES

George E. Sterling, W3DF-W1AE, on September 30th retired as a member of the Federal Communications Commission. The only amateur ever to hold a seat on FCC, and one of the few persons to reach commissionership through the ranks, W3DF has decided to return to his native Maine, after 30 years of distinguished government service.

George Sterling started on a radio career at the age of 14 through an early interest which developed, in 1908, to the operation of an amateur station. When licenses came into existence after the 1912 law he was one of the first to get the coveted ticket, and became 1AE, one of the two calls he now holds. As an Army officer in World War I, he helped organize the first communications intelligence work of the Signal Corps. After a postwar trick as a merchant marine operator, he became a radio engineer in the Department of Commerce, the government agency which administered radio — or, rather, "wireless" — affairs at that time. He moved up through the ranks of the field organization, later in the FRC and FCC, becoming its head during World War II, during which time he organized and headed the Radio Intelligence Division, a far-flung but closely integrated group of crack operators who kept detailed watch on enemy communications operations. Following the war he became the Commission's Chief Engineer, and one of his first projects in that capacity was the setting up of a special branch of FCC to handle amateur affairs. He was named to the Commissionership in 1948. Among other Commission responsibilities, he was co-chairman of the U. S. delegation to the Mexican high-frequency broadcast conference in 1948, and more recently had the job of supervising the "Conelrad" radio security set-up now being put into effect.

Throughout his professional career, George Sterling has maintained his devotion to amateur radio. His fellow commissioners have always looked to W3DF for advice and guidance in amateur regulatory matters up for their action. His personal interest remained as strong as strenuous official duties permitted; many a ham in recent years has found himself on the other end of a QSO direct with a commissioner of FCC! His intention to spend most of his time for the immediate future at his Maine home on Peak Island, in Portland harbor, means that W1AE, rather than W3DF, will be the call he will be using. Already he is working on a vertical for the front yard, and a recently completed single-sideband rig will be one of the transmitters heard from the Maine location.

We speak for the entire body of amateur radio in extending grateful appreciation for George Sterling's long service to his country, his steadfast championing of the amateur cause, and his own adherence to high amateur standards.

Good DX, George!

HURRICANE OPERATIONS

Amateur radio has just come through two more disasters — thoroughly unladylike despite their disarming code names of "Carol" and "Edna" — with, over all, an excellent record of performance. You might not think so from what we're going to say herein, inasmuch as we want to do a bit of soul-searching, so let us make it perfectly plain that the emergency communications job accomplished by amateur radio merits praise by any standards. Like you, we want to make the next task when it comes — and someday, come it will — an even more efficient job. And so we'd like to talk about a few of the gang who drag their feet.

We happened to have been operating on emergency power during the second hurricane, and in both we did a good many hours of lis-

tening to amateur operations; for the most part it was a thoroughly heartwarming experience. Unfortunately, there were several occasions when our veins chilled, especially one while listening to a 'phone net getting started. Smack on the frequency a hefty signal busted in to say, approximately:

W——, this is W——. Hi-ya, Joe. We gave you a call to find out how the XYL is (so far as we were able to determine, she had nicked her finger with a paring knife three days earlier — ED.). Hope she's feeling better now. Say, we hear a lot of stations in emergency nets and we don't want to cause 'em any interference, Joe, so we won't talk long. It's raining here and a bit windy, but don't think we're going to get much of the storm. These emergency nets sure do a fine job. Okay on just getting up and being in pajamas. Hi, hi. Well, so are we. We like to take things easy Saturday mornings. A fella needs relaxation, and we sure like ours, too. You have a fine signal this morning, Joe. Still using the same rig? . . .

And so on and on and on, while the net beneath him struggles to maintain communications. The problem here is one all too common to many of us, without our realizing it. We know there's an emergency (or potential one). We want to be coöperative. We don't want to cause any interference. But we haven't sufficient conviction to do what we really ought — keep the switch *off* unless and until we can do something constructive for the communications operation.

So even though you know you wouldn't intentionally ever cause an emergency net any difficulty, don't let that exclude you as one of the types who foul things up unknowingly.

In any emergency, or the course of setting up for one, keep your signals *off* the air unless you can actually contribute something to the job being done.

Strays

FCC files disclose a recent case of severe TVI caused by an amateur's keying monitor. The phenomenon is in the category of harmonic radiation from external nonlinear systems. The unit employed a crystal rectifier and neon lamp audio oscillator, producing twelve complaints.

—···—

WØEDB builds his own point-contract transistors and uses such units to QSO WØLBB and others on the 80-meter band. Nine volts at one ma. (one milliwatt) does the trick. He writes: "My transistors are made from the germanium elements of broken 1N55-B Hughes diodes, and No. 36 phosphor bronze wire. Values of alpha from 2 to 3 are easily obtained. . . . In addition to the knowledge gained from building one's own transistors, another benefit is the greater daring with which one tries out new transistor circuits. Previously, a mistake cost $15 but now it means merely rotating the germanium to a new spot and reforming." WØEDB recommends the article "Homemade Transistors," by P. B. Helsdon, in British publication *Wireless World*, Jan. 1954.

FEED-BACK

In "An R.F. Assembly for Mobile or Fixed-Station Work," page 12, October *QST*, L_3 in the parts list should be: B & W Miniductor No. 3012 (not No. 3007 as shown).

In Fig. 2, page 14, October 1954 *QST*, the dimension (1 $\frac{1}{32}$") shown to the upper right of hole "C" should be changed to $\frac{25}{32}$ inches.

OUR COVER

This interesting design is one for the Novice; a 40-watter for the 40- and 15-meter bands. Painless shielding takes care of Old Man TVI. Look for the rig in an upcoming issue of *QST*.

25 Years Ago this month

November 1929

. . . The editorial comments on public acknowledgment by the Federal Radio Commission of the radio amateur's contribution to the communications art.

. . . ARRL President Maxim was kept very busy poring over the hundreds of congratulatory messages resulting from "The Hiram Percy Maxim Sixtieth-Birthday Relay."

. . . "A High-*C* Heterodyne Frequency Meter" of high flexibility and utility is described by Assistant Technical Editor Beverly Dudley.

. . . Mr. Dudley also contributes "A Simple 1750- and 3500-Kc. Receiver," a two-tube regenerative model that very easily can be duplicated.

. . . "Operating Characteristics of Vacuum-Tube Oscillators," by H. A. Robinson, W3LW, clarifies much of the goings-on that can cause difficulties in rig performance.

. . . James J. Lamb, *QST* Technical Editor, presents "The UV-845," several pages of data on a 50-watt bottle that may find wide acceptance among amateurs.

. . . "Cascading Rectifiers," by J. M. Grigg, proposes a method for more complete rectification of alternating currents of minute potential.

. . . K. S. Weaver gives an interesting graphical and mathematical discussion of "The Use of the Distortion Rule in Power Output Calculation."

. . . In "Building Shields," H. D. Pendleton provides a wealth of constructional hints and kinks on the proper bending, cutting and assembly of metal stock.

. . . C. H. Hess, W3BLI, looks at a phase of commercial radio operating from the ham's standpoint in an article titled "Marine Radio of Today."

. . . The seventh of a *QST* series depicting up-to-date ham stations, "W8CAU" describes the elaborate installation in the University of Cincinnati's E.E. Department.

. . . "Ham's Hour," a bedtime story with a tragic ending, is profusely illustrated with W1CJD's drawings and is related by Uncle Jimmy and The Pied Piper.

. . . Interesting Experimenter's Section notes, Operating News items, IARU News overseas reports and voluminous Correspondence contributions round out the issue.

A Multiband 813 Final

Neat Construction Using a Popular Tube

BY RAYMOND F. RINAUDO,* W6KEV

• Proving that great minds sometimes do run in the same channels, this 813 amplifier, developed entirely independently by W6KEV, combines features found in rigs recently described in *QST* by WINWO[1] and WITRF.[2] The result is a unit that is not only attractive in appearance, but convenient to operate as well.

As most hams have learned, the coexistence of radio transmitters and TV receivers is not easy to achieve. Starting in 1949, when three stations came on the air in this locality, it has been a considerable battle trying to reduce the radiated harmonics below the level of the signals received in this fringe area, 75 miles from the stations.

The first attempts were along the lines of reduced grid drive and low-inductance condensers in the final plate circuit. Open-type construction was retained because bandchanging was desirable. Though they failed, these measures came surprisingly close to doing the job, considering the low TV signal level.

About this time, various TVI articles brought the lesson firmly home that a completely-shielded r.f. section, plus a low-pass filter, would be necessary. Several layouts were planned, but the shielding problem, and the expected lack of efficiency at ten meters with bandswitching, put a stop to any serious construction pending further developments.

Finally, the October, 1952, issue of *QST* appeared with the 4-250A amplifier article by George Grammer.[3] This was just the thing, and especially interesting was the statement, ". . . the efficiency . . . is exactly the same on all bands."

From that point on, it was a matter of revising Grammer's design to fit the parts available and the current state of the pocketbook. A variable inductance taken from a BC-375 was on hand, and that would team up nicely with the 813. The resulting circuit planned around that combination is very similar to the original, but there are a few differences worth noting.

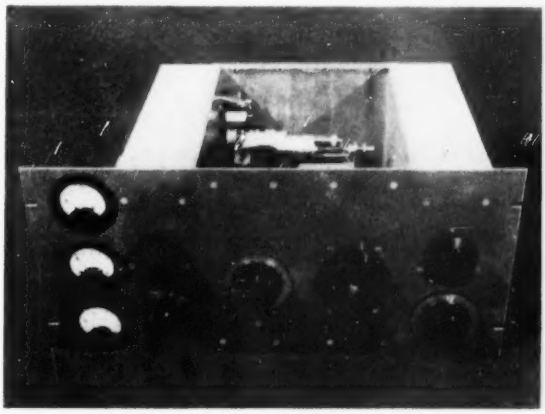
Circuit

The grid circuit uses coil switching rather than the multiband unit. This is a somewhat less bulky and less expensive way of doing the job, but does require more panel space.

It will be noted that the 3.5-Mc. grid coil has a 100-$\mu\mu$f. condenser permanently connected across it. This is to insure adequate C on that band, while at the same time allowing the use of a tuning condenser of much lower capacity.

The output side of the pi network uses a four-gang tuning condenser and additional fixed capacitors as the loading control. It is felt that this gives better control of the loading of the amplifier. Admittedly, however, this is at the cost of considerably more space. The spacing between plates of the condenser is about 0.025 inch, which will handle all that this amplifier will put into a 52-ohm load.

A 6Y6 is used as a clamper tube to reduce



A multiband bandswitching 813 amplifier with a shielding enclosure made up of standard chassis and bottom plates. To the right of the meters are the controls for S_1 (above) and C_2. At the center are the controls for C_{13} and L_{13}. To the right are controls for S_2 (above) and C_{14}.

* Box 185, Route 1, Acampo, Calif.

[1] Bridges, "High-Power Pi-Network Amplifier with Parallel Tetrodes," *QST*, May, 1954.

[2] Resconsin, "A Bandswitching 813 Ring with Pi-Section Output," *QST*, June, 1954.

[3] Grammer, "Pi-Network Tank Circuits for High Power," *QST*, October, 1952.

the screen voltage to a low value, hence, also, the plate current, when excitation is removed. The use of a clamper tube means that the grid bias and screen supplies are eliminated. When the plate voltage is comparatively low, as in this case, the loss in d.c. power in the screen-dropping resistor is not large, and the over-all result is a reduction in power-supply cost. At 1000 to 1500 volts from the plate supply, the danger to the 813 through failure of the clamper tube is certainly no greater than the danger caused by a bias-supply failure where such a supply is used to cut off or limit plate current.

Shielding Structure

The biggest problem to be faced was the construction of a suitable shield enclosure for the rig. The local tinsmith was consulted, but he was reluctant to buy a large sheet of aluminum, then to use only a portion for this amplifier. This is probably a common situation in the smaller towns. A little work with pencil and paper produced the fact that two three-inch-high chassis, placed on their sides with the tops facing each other, would allow plenty of room. The tube and its plate circuit could be placed between the chassis, and yet leave enough room at one side for meters to be placed outside the enclosure. All of it could be fitted on a 19-inch-wide panel. Accordingly, two 8 × 12 × 3-inch aluminum chassis were purchased, along with enough bottom plates to cover the two chassis and form the top, bottom and back plates of the plate-circuit shield.

The two chassis were then bolted to an 8¾-inch relay-rack panel, the right-hand chassis bottom being placed 1⅛ inches from the right edge of the panel. The second chassis was also fastened

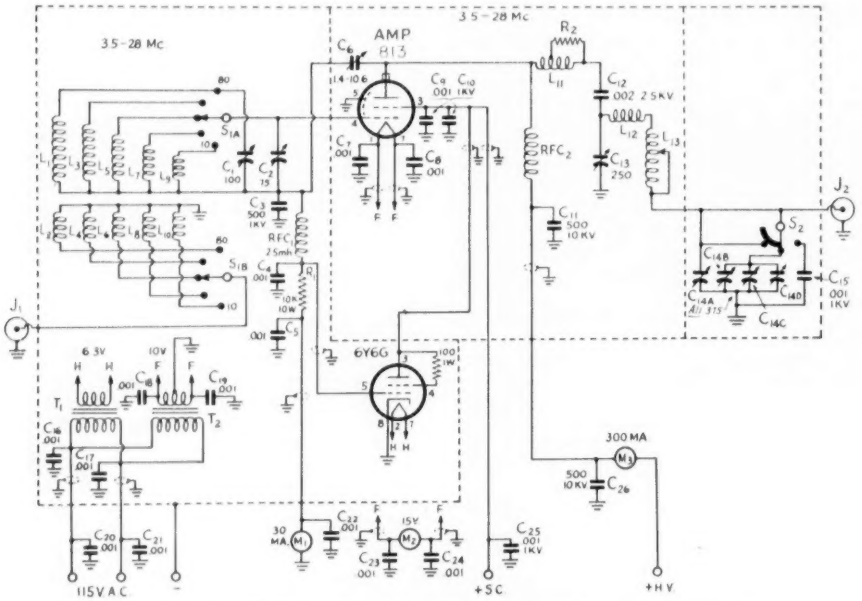
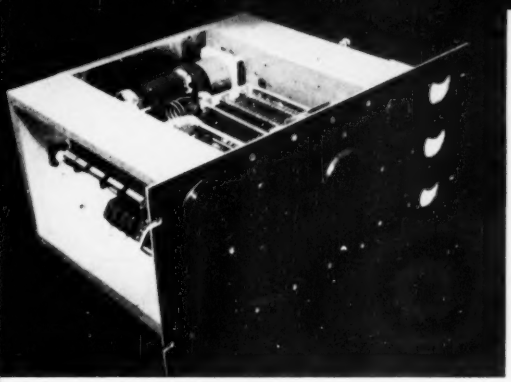


Fig. 1 — Circuit of W6KEV's 813 amplifier. All capacitances below 0.001 μf. are in μμf.

C_1 — Air trimmer.
C_2 — 0.025-inch plate spacing.
C_3, C_{12}, C_{15} — Mica.
C_4, C_5, C_7, C_8, C_9, C_{10}, C_{11}, C_{16}, C_{17}, C_{18}, C_{19}, C_{20}, C_{21}, C_{22}, C_{23}, C_{24}, C_{25}, C_{26} — Ceramic.
C_6 — Neutralizing condenser (Johnson N-250, 0.25-inch spacing).
C_{13} — 0.070-inch plate spacing.
C_{14} — Four-section variable gang, 374 μμf. per section, 0.025-inch plate spacing.
R_2 — Five 680-ohm 1-watt carbon resistors in parallel, tapped across 3 turns of L_{11}.
L_1 — 32 turns No. 24 enam., close-wound, ¾-inch diam.
L_2 — 3 turns No. 22 hook-up wire over cold end of L_1.
L_3 — 20 turns No. 20 enam., close-wound, ¾-inch diam.
L_4 — 3 turns No. 22 hook-up wire over cold end of L_3.
L_5 — 14 turns No. 20 enam., close-wound, ⅝-inch diam.
L_6 — 2 turns No. 22 hook-up wire over cold end of L_5.
L_7 — 10 turns No. 18 enam., ⅝ inch long, ⅝-inch diam.
L_8 — 2 turns No. 22 hook-up wire over cold end of L_7.
L_9 — 8 turns No. 18 enam., ⅝ inch long, ⅝-inch diam.
L_{10} — 2 turns No. 22 hook-up wire over cold end of L_9.
L_{11} — Parasitic suppressor — 5½ turns No. 14, ¼-inch diam.
L_{12} — 3 turns No. 10, ¾ inch long, ¾-inch diam.
L_{13} — Variable inductor from BC-375 (25μh. max.).[4]
J_1, J_2 — Coax connector.
M_1, M_3 — D.c. milliammeter, 2-inch.
M_2 — A.c. voltmeter, 2-inch.
RFC_1 — 125 ma.
RFC_2 — National R-175A.
S_1 — 2-circuit 5-position ceramic rotary switch (Centralab RR wafer).
S_2 — 3-position progressively-shorting ceramic rotary switch (Centralab P1S wafer).
T_1 — Filament transformer: 6.3 volts, 1.2 amp.
T_2 — Filament transformer: 10 volts, 5 amp.

[4] The B & W type 3852 rotary coil (15 μh.) has sufficient inductance to be used as a substitute, although it requires somewhat more space.



In this view, the 813 amplifier has been turned upside down to show the horizontally-mounted 813, and C_{13}. The rotary inductor, L_{12}, is partially hidden. Also shown in the shielding compartment at the left is the ganged variable, C_{14}.

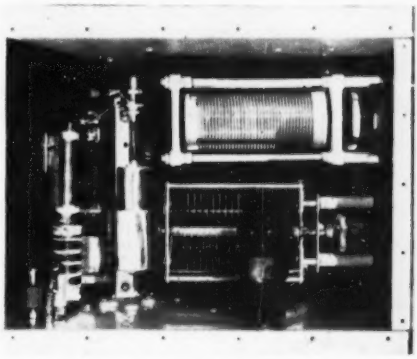
to the panel, being placed so that the chassis tops were $8\frac{1}{8}$ inches apart. The chassis were placed midway between the top and bottom of the panel to insure adequate room for the screws fastening the aluminum sheets which complete the plate-circuit enclosure. An $8 \times 9\frac{1}{8}$-inch plate was then cut from a chassis bottom plate, and fastened across the ends of the chassis to form the back of the plate-circuit enclosure. Next, four $8\frac{1}{8}$-inch lengths of $\frac{1}{2} \times \frac{1}{2}$-inch angle were made by sawing out the corners of a discarded aluminum chassis. This is doing it the hard way, as it was found after finishing the rig that 1×1-inch aluminum angle is available at most hardware stores at a fairly reasonable price. The $8\frac{1}{8}$-inch angles were then fastened to the top and bottom of the enclosure back plate, and to the back of the panel, top and bottom, between the chassis. The top and bottom plates, 12 by $9\frac{1}{8}$ inches, were then secured to complete the plate-circuit shield. This assembly gave three separate shielded enclosures — a $3 \times 8 \times 12$-inch box for the grid input circuit, an $8\frac{1}{8} \times 8 \times 12$-inch box for the plate circuit, and a $3 \times 8 \times 12$-inch box for the output circuit of the pi network. The last is not necessary, but is desirable and, in this case, convenient.

The bottom plate for the grid-circuit chassis is in two pieces — one 8 by 10 inches, and one 8 by 2 inches which is permanently fastened after the wiring has been completed. The gap between the two plates is effectively closed by means of a strip of aluminum 1 by $6\frac{3}{4}$ inches, which is fastened to the inside surfaces. All four removable plates, top, bottom and sides, are secured with 6–32 screws at approximately 2-inch intervals. Sheet-metal screws could have been used, and would have saved the considerable time required to tap the 80 holes needed to fasten the covers. A series of 45 holes, $\frac{1}{4}$-inch diameter, were drilled in both the top and bottom covers, directly above and below the 813 so that convection currents cool the tube.

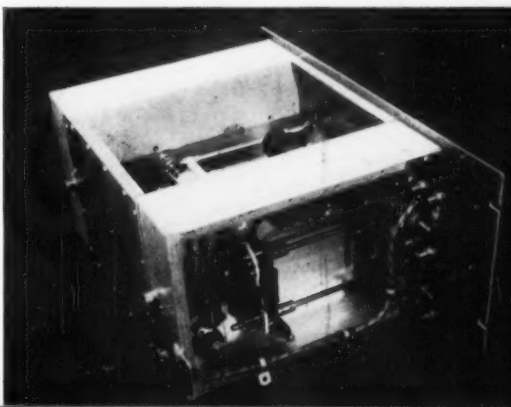
Assembly and Wiring

The two filament transformers are bolted to the top of the grid-circuit enclosure — an area which happened to be unobstructed by shafts. The socket for the 813 is mounted in the plate-circuit enclosure, and spaced $\frac{1}{2}$ inch from the chassis. It is oriented so that the filament of the tube will lie in a vertical plane. The filament and screen by-pass condensers are then grounded on the plate-circuit side of the shield. The plate tuning condenser is mounted on the front panel by means of stand-off insulators. As there is an insulated coupling between the condenser shaft and ground, this leaves only one path to ground — that through the wiping contact at the rear of

(*Continued on page 128*)



Looking down into the main compartment of the 813 amplifier, showing the placement of the pi-section components, neutralizing condenser, plate r.f. choke, and the 6Y6 clamper tube.



End view of the 813 amplifier, showing the grid-circuit assembly and filament transformers.

The Lazy Man's Panoramic Adapter

A Simple Means for "Watching" the Band

BY ROBERT W. EHRLICH,* W4CUU

• Here is a clever means for adding panoramic reception to your station with a minimum of work and expense. An easily-revamped BC-453 is used for the panoramic adaptor, together with a small power supply and a standard oscilloscope. The system is applicable to any receiver with an i.f. within the tuning range of the BC-453.

THE BC-453 low-frequency aircraft receiver has served in many of our shacks for several years as the "Lazy Man's Q5-er."[1] Now, with even better selective systems available, such as crystal lattice and mechanical filters, sideband selectors, and the like, you may be ready as the author was recently to put the old BC-453 on the shelf. Instead, here's how it can be converted to operate in conjunction with any standard oscilloscope to provide panoramic reception for your station receiver.

Fig. 1 shows how the converted BC-453, oscilloscope, and receiver are interconnected. Sweep

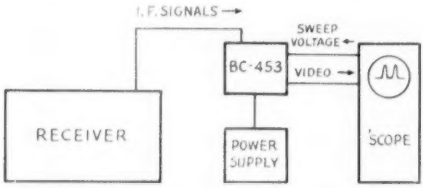


Fig. 1 — **Block diagram showing connections to modified BC-453 for panoramic reception.**

voltage taken from the 'scope plates is fed to the converted BC-453, in which the first r.f. tube is changed to work as a reactance modulator. This causes it to scan back and forth across the intermediate frequency of the station receiver. As each signal is encountered in this range, a positive output pulse is fed back to the vertical deflection plates from the 12SR7 tube, which is now converted to operate as a d.c. amplifier working below ground. The conversion job also includes removal of the 12A6 audio amplifier and construction of a special power supply.

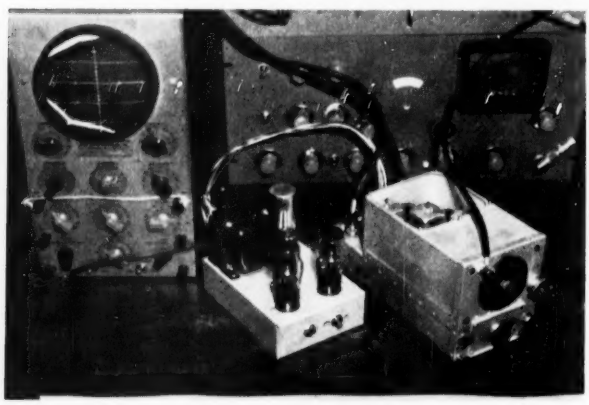
The maximum sweep width of this panoramic adapter is about 30 kc. While this is somewhat less than the sweep width of most commercial units, it seems quite adequate for all of the functions described above. To make this unit sweep a broader range of frequencies would entail a much more elaborate and involved conversion job.

Circuit diagrams of the affected portions of the BC-453 receiver are shown in Figs. 2 and 3. Studying the circuit features in Fig. 2, it will be noted that both tuned r.f. circuits are left in the path between the signal input and the converter input grid. This permits some degree of stagger tuning to compensate for the selective characteristics of the various amplifiers in the station receiver. In the new reactance modulator, resistor R_3 acts in conjunction with the inductance of RFC_1 to form the 90-degree phase-shift network required to drive the grid of the tube. RFC_2 is added to provide for the relatively large current drain of the reactance modulator and still insure that enough plate voltage remains on the oscillator section of the 12K8 tube.

Back in the output portion (Fig. 3) the prin-

* 511 Eastwood Place, Birmingham 9, Ala.

[1] Goodman, "The Lazy Man's Q5-er," *QST*, Jan., 1948.



A revised BC-453 working into a normal 'scope furnishes panoramic reception at W4CUU. The special power supply can be seen between the BC-453 and 'scope — the receiver is at the rear.

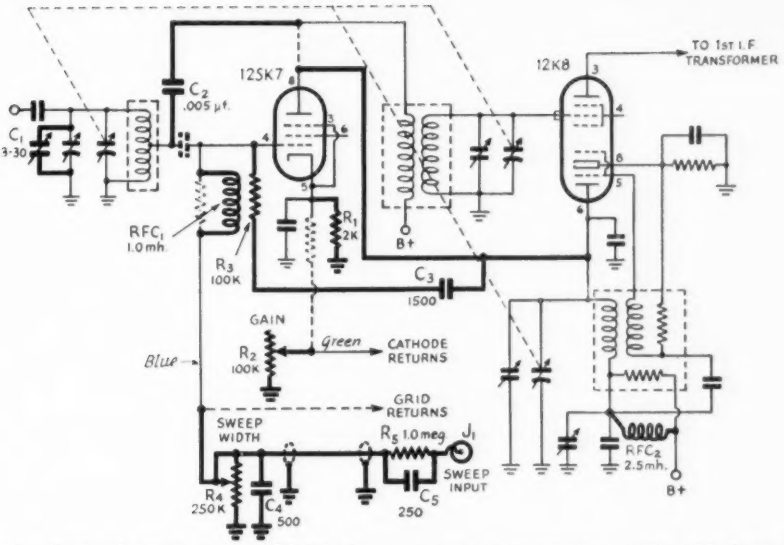


Fig. 2 — Front-end portion of revised BC-453. New connections and components are indicated by heavy lines — removed components and wiring is indicated by dashed lines. Resistors are ½ watt unless otherwise noted. Capacitors are mica or ceramic — values are in μμf.

R_2 — Mallory U-40 or equivalent with bias taper.

R_4 — Linear taper.

cipal change is to divorce the cathode and grid circuits of the 12SR7 tube from ground and work from −105 volts instead. The fixed resistors in the plate circuit of this tube are arranged to set the maximum peak saturation level about 1 inch above center on a 5-inch 'scope tube, and the potentiometer R_6 adjusts to no-signal base line to fall about 1 inch below center. Changes in R_8 can be made if required to set the peak saturation level at any point desired if different 'scope characteristics are encountered.

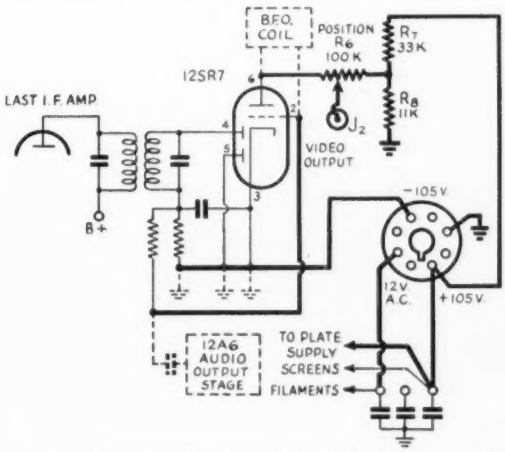


Fig. 3 — Output portion of modified BC-453. New connections and components are indicated by heavy lines — removed components and wiring is indicated by dashed lines. Resistors are 1 watt.

R_6 — Linear taper.

J_2 — Standard headphone- or microphone-type jack.

Construction

The job can be started by cleaning out all components mounted to the rear of the last row of tube sockets, except for the large $3 \times 0.22\mu$f. condenser mounted on the side wall just behind the last i.f. transformer. As each component is removed, take out all the wires leading to it. All this will leave plenty of room to install and wire the new power socket, potentiometer R_6, the video output jack, and everything else shown in Fig. 3, together with the sweep input jack and R_5 and C_5 that appear in Fig. 2. The only item that may not be self-evident is where to make the connection marked "To Plate Supply" in Fig. 3; this circuit can be picked up at the third lug from the rear on the inside of the left rear resistor board, where several red leads come together.

Up front, everything mounted under the chassis ahead of the coil assembly can be cleaned out except the antenna trimmer. Take out all wires to the power socket except the green cathode return lead which, as shown in Fig. 2, will go to the gain control potentiometer R_2. Space is now available to install and wire the two potentiomers, R_2 and R_4, and condensers C_1 and C_4.

If it has not already been done, you will probably wish to rewire the heaters in parallel for 12-volt operation. The

special power supply shown later in this article is designed to furnish 12 volts. Of course, no rewiring would be needed if you have a suitable 24-volt transformer and would prefer to use it, but in such case it will be necessary to keep the 12A6 tube in its socket even though it serves no real circuit function.

Certain of the r.f. connections in the front end

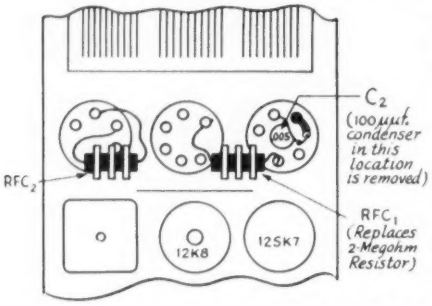


Fig. 4 — Top view of chassis showing how the new components are mounted on the coil socket terminals. Other wires and components not shown in this sketch are left in place.

can be greatly simplified by following a few simple steps. First, the coil assembly is removed by taking out one retaining screw on each side of the chassis and pulling out the whole assembly. Underneath, a red lead runs from the socket of the center coil to the plate (Pin 8) of the 12SK7 r.f. amplifier. Disconnect this lead from the tube and pass the free end up through a hole in the antenna coil socket, there to be connected later to C_2. Next, there is a blue (grid return) lead running from the center coil socket back to one of the resistor boards. This lead should be disconnected from the resistor board and swung over to the sweep-width potentiometer R_4.

On top of the chassis, the two chokes RFC_1 and RFC_2 and condenser C_2 are mounted as shown in Fig. 4. Leave one end of C_2 disconnected until preliminary alignment is completed.

Under the chassis again, locate the 620-ohm cathode resistor for the 12SK7 r.f. tube on the terminal board nearest this tube, remove the resistor, and install R_1 direct from cathode to ground. Also, add the new lead required between Pin 6 of the 12K8 tube and Pin 8 of the 12SK7.

Install the phase-shift circuit (C_3 and R_3) between Pin 6 of the 12K8 and Pin 4 of the 12SK7. The junction of these two components should simply be made "up in the air" to keep stray capacity down. Make sure that C_3 is a good sound condenser with no leakage, and that R_3 has clearance from other things as it passes over the 12SK7 tube socket on the way to Pin 4.

Connections to the 'Scope

The leads for connection to the 'scope can be made of shielded microphone cable. The sweep lead should be tapped directly on to one of the horizontal deflection plates in the 'scope. The video output lead should go directly to one of the vertical deflection plates *in place of* the existing deflection lead from the 'scope amplifier. These connections can be made very easily if the 'scope has a terminal board in the back for its deflection leads; otherwise it will be necessary to go in to the internal wiring. If your 'scope uses push-pull deflection, the above connections need to be made to only one plate of each pair.

Power Supply

A recommended power supply circuit is shown in Fig. 5. It provides the required positive and negative 105-volt outputs as well as 12 volts a.c. Perhaps most important, the d.c. supply voltages are virtually hum-free as a result of heavy filtering and use of VR tubes. Sad experience with rather ordinary power supplies showed that even small amounts of hum or ripple voltage caused distortion and displacement of both the base line and the signal peak itself. It may also be mentioned that 60-cycle ripple would cause fewer convolutions per sweep cycle on the 'scope than 120-cycle ripple, so the half-wave rectification used in the recommended power supply is really preferable to a full-wave circuit.

Alignment and Installation

For preliminary trimmer adjustment, set the oscillator trimmers nearly to minimum capacity, the r.f. trimmers nearly to maximum, and the two antenna trimmers to mid-position. Note that the oscillator and r.f. trimmers (mounted above the corresponding tuning condensers) each consist of two little condensers mounted back to

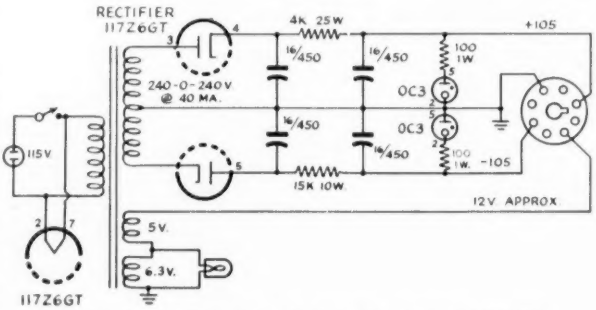


Fig. 5 — Suggested power supply circuit for the revised BC-453.

back; use sections to obtain the desired minimum or maximum capacity.

Turn the set on and set the desired base-line position on the 'scope with R_4. The sweep rate on the 'scope is best set at 30 or 60 cycles, no higher. Now, set a signal generator or grid-dip oscillator at the intermediate frequency of the station re-

(*Continued on page 150*)

A Transistor Superregenerative Receiver for 10 and 6 Meters

Workable Receiver Draws 0.06-Watt Total Drain!

BY W. A. WADSWORTH,* W2ZKE

With the coming of the new electronic device known as the transistor, there has been increasing interest in how it can be applied to amateur use. This article describes a transistor receiver that operates on 10 and 6 meters using the principle of superregeneration.

After some thought and trials of different types of oscillator circuits, the circuit that gave the best results, both for stability and sensitivity, is shown in Fig. 1. The detector is a operates as a relaxation type oscillator, the quench frequency being determined by R_1, R_2 and C_1. R_4 serves as a regeneration control and an audio load. R_2 and R_4 are adjusted for best performance.

In using this receiver with a high power transmitter near-by, the antenna input to the receiver should be grounded during the transmission to protect the detector from high r.f. voltages.

The audio stage gives between 35 and 40 db. of gain and will drive a set of 2000-ohm 'phones

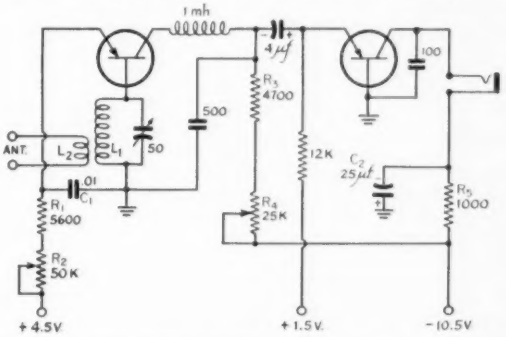


Fig. 1 — Schematic diagram of the transistor superregenerative receiver.
L_1 — 10 turns, $\frac{3}{8}$-inch diam., 1 inch long.
L_2 — 4 turns over cold end of L_1.

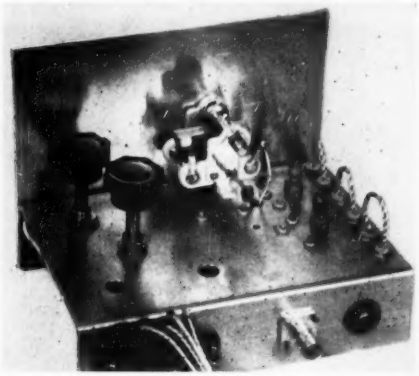
Western Electric 1734; the audio a 1698. RCA numbers 2N33 and 2N34 also may be used.

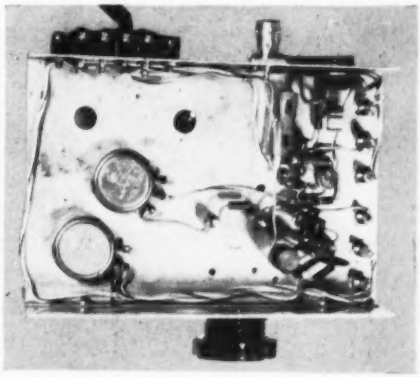
The detector has a tuned circuit in the base which is coupled to the antenna in the conventional manner. The emitter is used to generate quench frequency, between 20 and 100 kc. It very nicely. C_2 serves as an audio decoupling to prevent motor boating. R_1, R_3, and R_5 are current-limiting resistors to protect the transistors from burnout.

Signals can be brought in on this receiver as well as they can on an "old-fashioned" tube

* P.O. Box 258, Pequannock, N. J.

(Continued on page 134)





Rear and bottom views of the transistor superregen for 10 and 6 meters. As this is an experimental layout, no attempt was made to achieve extremely small size, but it is still only a medium-sized handful!

A Public Relations Project

Baltimore Club Capitalizes on Amateur Radio Week in Maryland

BY HAROLD E. ARCHER,* W3SKK

• Here's the story of what one live-wire ARRL affiliated club has recently accomplished in the field of good public relations for amateur radio. Instead of waiting for an opportunity, the club provided it!

SPORADICALLY, we hams "make the news." Perhaps we catch an SOS, or we relay disaster messages, quickly, efficiently. For the moment, we are in the news, and the public gets a glimpse of our activity. But it's just a glimpse. Why not have a public relations program spearheaded for a definite period of time in which we could explain fully just what we amateurs are and are trying to do?

With this in mind, as President of the Baltimore Amateur Radio Club I wrote to Governor Theodore R. McKeldin of Maryland, informing him of our activities, of our varied membership and of our earnest desire to get the public more fully to recognize amateur radio. I respectfully requested that he issue a proclamation declaring the week climaxing in our annual Field Day to be Amateur Radio Week in Maryland.

Shortly thereafter, I received a very kind letter from the Governor assuring me of the issuance of the Proclamation. Executive members of our club were then contacted and the "Amateur Radio Week Committee" was immediately organized. This group was composed of Walt Gisriel, W3DC, chairman, and members W3 AFR, RKK, THM, EQK, IUC and SKK.

Incidentally, it was here we ran into an interesting coincidence. When we called Art Plummer, W3EQK, our SCM, to inform him of the Governor's action, he told us that just that very day he had received word from Headquarters of W2OEU and W4OVO's action in seeking to get a National Week proclaimed through Congress.

Our first step was to arrange for a formal presentation of the Proclamation and, realizing (1) that the public was particularly interested at the time in civil defense and (2) that we amateurs were to play an important rôle in this effort, our chairman invited the c.d. officials as our honored guests. State and city directors attended, as well as the communications officer for the State. Photographs were taken of the ceremony (see June '54 *QST*, page 32, for photograph; May '54 *QST*, page 55, for text of Proclamation) and statements made by the c.d. officials proved valuable in later publicity.

Well, many committee meetings were held, and then the Week arrived!

On Monday, June 14th, an amateur radio station was set up in Governor McKeldin's office on the thirty-second floor of the Mathieson Building in Baltimore City. The plan was for the Governor to send a message to the other forty-seven Governors advising them of his action in declaring this special week and urging the other Governors likewise to proclaim a "week" for their citizens. As we were informed that WMAR-TV was going to cover the ceremony on both film and tape (and, naturally, not having opportunity to try out our station set-up in advance), we decided to play it safe by seeking only to contact another local station who in turn would relay the message to the MARS contact, W3WBP. Everything worked very smoothly! At 5 o'clock, with SKK at the controls and the Governor at the microphone, we made contact with W3DC, at his

* 5721 Bellona Ave., Baltimore 12, Md.

Governor McKeldin sends message to other governors, with an assist from W3SKK at his left. *Standing:* W3s THM, FUV, PRL, H. A. Cohen of FCC, and W3EQK (*Photo from TV film*)

W3ESM mobile and W3HOP accept a message to a serviceman during Maryland's Amateur Radio Week.

home in the suburban area of the city. A QSO was held, the message sent and shortly thereafter Walt relayed the forty-seven messages onward. In Baltimore, we are proud of our local FCC office and H. A. Cohen, Engineer-in-Charge, was our honored guest on this occasion.

Tuesday, June 15th, WMAR-TV gave two evening time showings of the film made at the Governor's office. To say the least, these showings were extremely effective in "advertising" our week. Much credit goes to Marx Kaufman, W3IUC, for making these arrangements.

Wednesday, we held a dinner. Now we announced it officially to local ham groups as the "Amateur Radio Week Dinner"; but, unofficially, on the sly, we told them the real purpose — to honor our good friend W3AFR, George Hannah, telephone executive, who is soon to retire and leave this area. George was surprised and a swell time was had by all.

Regarding this dinner we did not seek in any way to publicize the event to the general public. We were just meeting with ourselves to honor one of our own. However, it has since occurred to us that it might be a good idea to have just such a dinner each year and at that time present an award to the ham who, in our particular area, during the past year, has done most to promote and uphold amateur radio. We think it might be well to exclude the officials of the different clubs in order to make the individual members strive a bit more. Such an award throws open all sorts of promotion possibilities — radio, TV, newspaper interviews, etc. And such a thing would do wonders for the OM who says, "I'm just an ordinary club member," but who actually works hard and sets a fine example for amateur radio.

Thursday, June 17th, saw two important public relations activities. From noon to 12:30 P.M., on Radio Station WFBR, the entire half hour was dedicated to Amateur Radio Week. An interesting aspect was W3EQK being interviewed by announcer Phil Crist, W3NNX, with Paul, W3NKY, at the studio controls, and at the transmitter, the engineer, W3PKN. Lou Corbin, program director for the station, even wrote a special piece of poetry on ham radio. On the program was also announced the second event of the day — that at 7:30 P.M. mobile units would be stationed in a number of shopping centers throughout the city. We would gladly send messages to relatives overseas in service! This announcement was also made on a number of other stations as part of their station breaks.

Promptly at 7:30 that evening the mobile units made up of members of the Baltimore Amateur Radio Club, the Chesapeake Amateur Radio Club and the Maryland Mobile Club took their assigned locations throughout the city. Communications were established and from then until about 9:15 messages flowed to net control. Newspaper publicity, as well as radio, made many aware of our service; but, in addition, each car carried two signs as further announcement:

ATTENTION
The operator of this car is an
AMATEUR RADIO OPERATOR
Through him you may send a message (HAMGRAM)
FREE OF CHARGE TO SERVICE PERSONNEL
Anywhere in the world.

This phase of the Week was led by W3EQK and the following stations participated: W3s JAS, VLL, RQP, NNX, EQK, QLG, FMG, LMC,

Broadcast during Amateur Radio Week. *L. to r.:* W3NNX, W3NKY, Helen Brooks, Editor and Producer of "Women's Affairs," W3EQK (SCM, Md.-Del.-D. C.), and Lou Corbin, writer, announcer and producer.

THE HONORABLE THOMAS E. DEWEY
Governor of the State of New York
Albany, New York

As Governor of the free State of Maryland, I have proclaimed June 14-20, 1954 as Amateur Radio Week. I have done this because radio operators of my State have contributed to a very considerable degree to the communications system of Maryland. Throughout the United States amateur operators often have been active in time of emergency, in floods, fire, and in time of man-made catastrophes.

We have found them indispensable in our vast network established for Civil Defense. They receive no compensation for the work and far less public recognition for their participation as well as general activities in the public good.

I respectfully request that you honor the amateur radio operators of your State by a proclamation.

THEODORE R. MCKELDIN
Governor of Maryland

—···—

HON. THEODORE R. MCKELDIN
Governor of the State of Maryland
State House
Annapolis, Maryland

Heartily endorse everything you say in praise of the valuable public service rendered by amateur radio operators.

In New York State as in Maryland and all over the Nation, they are a vital adjunct to our civil defense system. We could not carry on with full efficiency without them. In time of disaster and other public emergency their facilities for rapid communications have helped to save human lives and to bring succor to many men, women and children in distress areas. Their patriotic services during the war were devoted and are unforgettable. Their experiments and scientific observations which many of them carry out are of genuine importance in the development and progress of electronics. The ham operators deserve the warmest public appreciation.

THOMAS E. DEWEY
Governor of the State of New York

SSF, JCL, QBG, ESM, TRW, JE, BH, NKY and IFW. The mobile sending of hamgrams was a great success. We gave them something. We also let them see our operation.

Here let's be very frank. Many people are not interested in a matter unless it affects them in some very direct way or another. Being involved in the circulation end of a large newspaper, I have found that with all promotional aids and novelties, nothing beats samples or "complimentary copies." You see, you're giving something of value without cost; your're also presenting an opportunity for a person to examine fully your product — to see what it's all about.

Consider this: The person who sends a message via amateur radio is pleased and interested — perhaps thrilled — in this means of communication. That interest and pleasure or thrill is more than doubled when a letter comes from that boy overseas: "I just got back from maneuvers and your hamgram was given me. Hearing from home was wonderful and you had just sent it a few hours before. I felt for a minute as if I were back home with you." This is the kind of publicity that works wonders! Needless to say, it is of utmost importance that every message accepted be sent, and promptly.

Friday, June 18th, the XYLs were honored in a local newspaper. In a two-column spread, Evelyn Ruckert, W3PJL, was interviewed concerning amateur radio and, in particular, regarding the stand-by station which she operates with her OM. This article pointed out in a very fine manner both the so-called hobby side, as well as the public service facet of ham radio.

Also on Friday, four radio amateurs appeared as guests on a quiz program on WBAL-TV. We had a lot of fun and Amateur Radio Week was again proclaimed!

Then the climax: On Saturday, Field Day! We won't go into detail on this as hams, generally, are familiar with such activities. Suffice it to say that Dave White, W3FUV, and his assistants did a fine job in directing the twenty-four hour activity. We're waiting now for *QST* to tell us how we made out in comparison with other stations. Again, the public was given an opportunity to see amateur radio in action.

The Week's activities went smoothly. But, what are the mechanics, the "behind the scenes" activity, which result in newspaper, radio and television publicity?

Well, of course, the Proclamation is the nucleus of any plan. To obtain this was fairly easy. The main thing in this regard is to contact your Governor several months in advance of the special week. This is important for two reasons: first, so that you will not find that week already taken up; and, secondly, so that having the Proclamation all ready, you can bide your time to spring an official announcement. For example, we literally had the Governor's Proclamation in our hands weeks before the formal presentation. In our case, the right time seemed to be a new awakening here in Baltimore for civil defense. In your locality, the right time may be a visit of a movie or television personality or of some famous OM, etc. With the Proclamation, you are all set.

In many towns, photographs and press releases of the issuance of a Proclamation will get

(Continued on page 134)

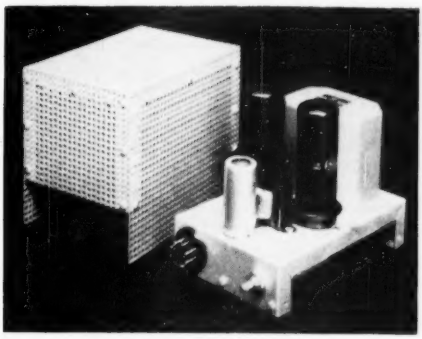
W2FMA delivers Gov. McKeldin's message to Gov. Dewey whose reply praised amateur work in New York.

Audio for the Mobile or Fixed-Station R.F. Assembly

A 25-Watt Modulator for the Ganged Multiple-Circuit Tuner Rig

BY C. VERNON CHAMBERS,* W1JEQ

As indicated by the title, this article will describe a companion audio system for the six-band mobile transmitter.[1] In fact, the modulator to be discussed and illustrated is the very unit mentioned in the closing paragraph of the transmitter constructional article. It is an exceedingly simple 3-tube arrangement that includes both the speech-amplifier and the modulator circuits. Maximum power output — approximately 25 watts — is sufficient for 100 per cent modulation of the r.f. amplifier when the latter is operated with an input of 50 watts. Depending on the input circuit selected (two arrangements will be presented) either a crystal or a carbon microphone may be used with the speech amplifier. Power consumed by the complete unit can be safely taken from the supply for the r.f. amplifier providing the pack has a spare 100 ma. or so for the purpose. Considering the power output level, the unit is quite compact, having no dimension greater than $6\frac{1}{4}$ inches.

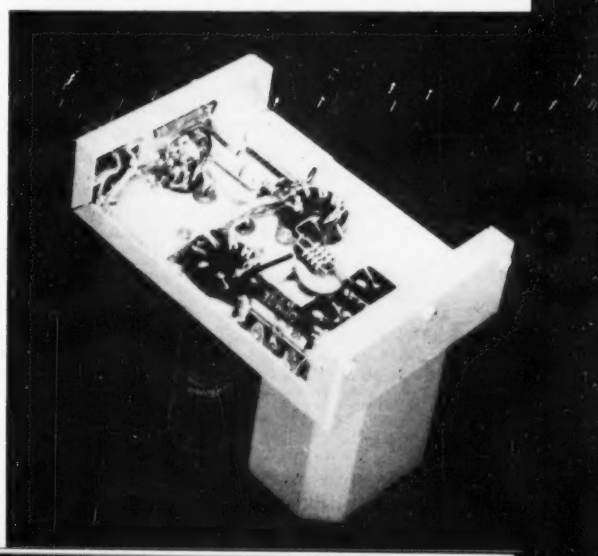


The modulator in the foreground is laid out on a homemade chassis measuring $1\frac{1}{2}$ by $4\frac{1}{4}$ by $6\frac{1}{2}$ inches. The interstage transformer, T_1, is centered between the shielded 12AX7 and the 6L6s. The modulation transformer is at the rear of the chassis. J_1 and the gain control are mounted on the front wall of the unit. The sides of the chassis are enclosed by the perforated cover when the latter is slipped in place.

Before entering into a detailed description of the audio system, it may be advisable to explain why Class AB_1 operation for the modulator was selected in preference to the Class B mode ordinarily favored for mobile work. Actually, the type of operation was dictated by the desire to obtain 25 watts output from a small package — space is usually at a premium in a mobile installation. In general, most of the Class B tubes that will deliver 25 watts are fairly large bottles, not particularly well suited to compact equipment of simple constructional design. On the other hand, a pair of 6L6s, operated Class AB_1, will deliver the necessary audio power without making excessive demands on space. Furthermore, the higher resting current of the AB_1 stage — as compared to a Class B circuit of equivalent output capability — reduces the percentage change in d.c. input with voice excitation, helping to relieve the problem of plate-voltage regulation. Then, too, there is the fact that Class AB_1 drive requirements are met much more easily and economically than are those of a Class B stage. The modulator grids require no *power* excitation with the result that the driver can be a small tube working into an inexpensive interstage transformer.

The Circuits

The circuit of the audio unit, wired for crystal-microphone input, is shown in Fig. 1. One half of a high-μ dual triode — a type 12AX7 — is used as a resistance-coupled amplifier, and the second



Bottom view of the 25-watt modulator. A cut-out measuring $1\frac{3}{4}$ by $2\frac{1}{4}$ inches, located at the end of the chassis, provides access to the modulation transformer terminals. C_5 and R_7 are mounted on a tie-point strip at the lower left-hand corner and C_6 and R_8 are centered between the cut-out and the 6L6 tube sockets. C_4 is located at the upper right-hand corner, just to the right of C_2. Component symbols refer to Fig. 1.

* Technical Assistant, *QST*.

[1] Chambers, "An R.F. Assembly for Mobile or Fixed-Station Work," *QST*, October, 1954, p. 11.

♦

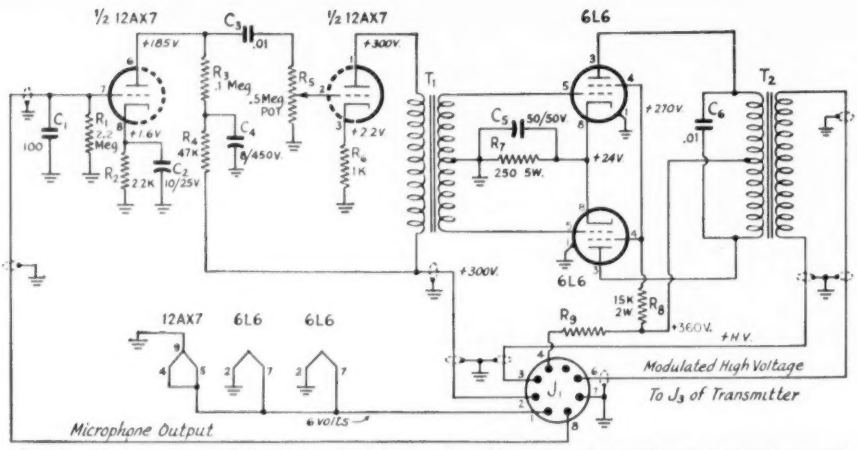


Fig. 1 — Circuit diagram of the 25-watt modulator wired for crystal-microphone input. Unless otherwise specified, all resistors ½ watt.
R_9 — See text.
J_4 — 8-prong male connector (Amphenol 86-CP8).
T_1 — Interstage audio transformer, single plate to push-pull grids, secondary-to-primary turns ratio 3 to 1 (Triad A-31X).
T_2 — Universal modulation transformer, 30 watts (UTC S-19).

section of the tube is used as a driver for the 6L6s. The gain control, R_5, is located in the grid circuit of the driver and T_1 is used for coupling to the 6L6 grids. The gain developed in the 12AX7 stages is more than adequate for driving the modulator grids even when the driver cathode is unby-passed as shown.

Cathode bias for the 6L6s is developed across R_7 and the screen grids are returned to the plate supply through R_8. A universal modulation transformer, T_2, is used to match the 9000-ohm plate-to-plate load resistance of the 6L6s to the r.f.-stage load. The natural frequency response of the modulator has a pronounced peak at 3000 cycles. The more desirable response curve shown in Fig. 3 is obtained by connecting a 0.01-μf. capacitor, C_6, across the primary of T_2.

Additional data pertaining to the value of C_6 as associated with frequency response and r.f. load impedance will be found elsewhere.[2]

A circuit which shows how the speech amplifier should be wired for carbon-microphone input is shown in Fig. 2. In this arrangement, one half of the tube is used in a grounded-grid input circuit. The Class A driver uses the second section of the dual triode and, as before, is transformer-coupled to the modulator. Microphone voltage is obtained by connecting the carbon microphone in series with the cathodes of the 12AX7. Notice that, in Fig. 2, the driver cathode resistor has been lifted from ground and then returned to Pin 8 of the input tube and that it has been by-passed with a 10-μf. capacitor, C_3.

A single-cable connector, J_1, is used for all of the voltage leads entering and leaving the audio chassis. The pin numbering and the wiring of J_1 are arranged to correspond with those of J_3 of the r.f. unit.[1] If the wiring of J_1 of the audio chassis and that of J_3 of the r.f. unit are made to correspond, it will not only assure that the proper voltages are fed to and from the audio circuits, but it will permit monitoring of the modulator plate current by means of the transmitter metering circuit.

Construction

As is the case with the transmitter, three types of aluminum — plain sheet, perforated sheet, and angle stock — are used in the fabrication of the audio unit.[3] The specifications for the material used are as follows:

Alcoa 2SH-14 aluminum sheet, 0.064 inch thick:

Chassis — 5¼ by 9¼ inches
Bottom plate — 4⅜ by 6¼ inches

Perforated aluminum sheet for cover, 0.051 inch thick:

2 pcs. (sides) — 5¼ by 6¼ inches
2 pcs. (front and rear) — 3 11/16 by 4 5/16 inches
1 pc. (top) — 4⅜ by 6¼ inches

Angle stock: Approximately 45 inches, ½ by ½ by 1/16 inch

In addition to the above, 5 dozen No. 6 self-tapping screws are used in the assembly.

The two photographs that illustrate the modulator show how the largest sheet of plain aluminum is bent to form a chassis measuring 1½ by 4¼ by 6¼ inches. Lengths of ½-inch angle, fastened flush with the bottom edges of the end walls, provide surfaces to which the bottom cover may be fastened.

The top view of the unit shows the locations of the tubes and the transformers. Although the layout is compact, there is no undue crowding of components above deck, and it should be a simple matter to duplicate the arrangement of parts, provided the sockets for the 6L6s have

[2] "Suppressing Audio Harmonics," Chapter 9, *ARRL Handbook*.
[3] Information regarding sources of perforated aluminum will be found on page 38, *QST* June, 1954.

been properly located. These two sockets are mounted in line with $2\frac{1}{4}$ inches between centers, and are centered back from the front of the chassis by a distance of $2\frac{7}{8}$ inches. As seen in the bottom view, the sockets are mounted with the keys pointing toward the right.

The interstage transformer, T_1, is centered $1\frac{3}{4}$ inches back from the front of the chassis. A pair of holes, equipped with rubber grommets, provide through-chassis clearance for the primary and secondary leads of the transformer. The socket for the 12AX7 occupies the space between T_1 and the front edge of the chassis and, as seen in the bottom view, is mounted with Pins 4 and 5 facing toward the left. T_2 is centered over the cut-out to the rear of the 6L6s and terminal-connection data for the transformer are discussed later.

Nearly all of the components mounted on the under side of the chassis have already been identified in the cut label of the bottom view. The arrangement of parts shown in this view is the one used when the speech amplifier is wired for crystal-microphone input. Naturally, the layout will be still further simplified if the carbon-microphone input circuit is employed. Resistors R_1, R_2, R_3 and R_8 (Fig. 1) are grouped around the 12AX7 tube socket, and C_1 is connected between Pin 7 of the socket and ground, with the shortest leads possible. The interstage coupling capacitor, C_3, mounted parallel with the front wall of the chassis, is supported by Pin 6 of the socket at one end and by the input terminal of the gain control, R_5, at the other end. A one-terminal tie-point strip, located directly above the right-hand 6L6 socket (bottom view) serves as the common connection point for R_3, R_4 and C_4. Belden type 8885 wire is used wherever shielded leads are shown in the circuit diagram.

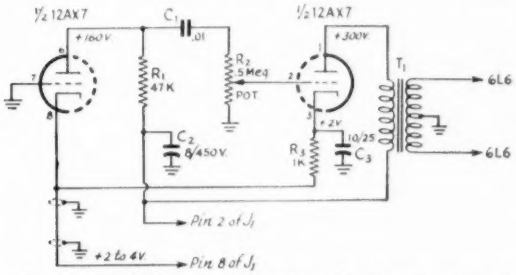


Fig. 2 — Circuit diagram of the carbon-microphone input circuit for the 25-watt modulator. All resistors, ½ watt. T_1 — See Fig. 1.

The top view of the modulator shows the perforated cover in the background. Lengths of $\frac{1}{2}$-inch angle, held in place by means of self-tapping screws, are run along the closed edges (inside) to hold the box together. The sides of the cover extend down below the front and the rear sections by a distance of $1\frac{9}{16}$ inches and thereby enclose the open sides of the chassis when the cover is placed over the modulator unit. The cover and the chassis are ordinarily held together by means of self-tapping screws which pass through the perforated aluminum and then tap into the flanges of the chassis.

Testing

If the modulator is to be bench tested before it is installed in a vehicle, it is convenient to use a.c. for the heaters. In this case, the 6.3-volt transformer should be rated at not less than 2 amp. and must be connected to Terminals 1 and 7 of J_1. Plate voltage for the 12AX7 may be obtained directly from a 300-volt supply connected to Terminal 2 of J_1, or it may be taken from the 6L6 plate supply via a dropping resistor connected between Terminals 2 and 4 of J_1. If the plate supply for the 6L6s delivers 360 volts — the most desirable voltage for the tubes — the 1-watt dropping resistor should have a value of 22,000 ohms, provided the speech amplifier has been wired for crystal-microphone input. If the grounded-grid input circuit has been used, a 15,000-ohm resistor will be satisfactory. If the voltage applied to Terminal 4 of J_1 is other than 360 volts, the correct value of dropping resistance may be based on a combined plate-current flow for the 12AX7 of either 4.5 ma. (crystal-microphone input) or 6.6 ma. (carbon-microphone input).

If a 360-volt supply is connected to Terminal 4 of J_1, it is not necessary to employ R_9 of Fig. 3. On the other hand, if the plate supply output is in excess of 360 volts by any substantial amount, it is advisable to reduce the plate voltage for the 6L6s by means of a resistor (R_9). This resistor should have a value of 10 ohms for each volt that the power supply delivers above the aforementioned value — 360 volts.

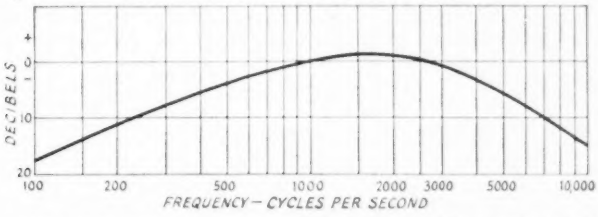


Fig. 3 — Frequency response curve of the 25-watt modulator with 0.01-μf. capacitance connected across the primary winding of the modulation transformer.

During the bench testing of the audio circuits, it is convenient to load the secondary of T_2 with a slider-type 25-watt resistor having a value equal to the r.f. load impedance (Z_m) with which the modulator will eventually work. The Z_m, or load resistance which will be presented by the modulated r.f. amplifier, is equal to

(Continued on page 138)

Distortion in Single-Sideband Linear Amplifiers

Causes, Cures, and Methods of Measurement

BY WARREN B. BRUENE,* WØTTK

• Besides offering a timely discussion of the origins of the principal types of distortion in linear amplifiers and the measures that need to be taken to reduce it, this article describes a new method for checking the linearity of an amplifier. The "linearity tracer" is a highly useful tool for the s.s.b. enthusiast.

WHEN the envelope of a modulated signal is distorted, a great many new frequencies are generated. These represent all of the possible sum and different combinations of the harmonics of the original radio frequencies. Since r.f. amplifiers use tank circuits, all distortion products are filtered out except those which lie close to the desired frequencies. These are all "odd order" products: third order, fifth order, and so on.

The third-order product frequencies are $2p - q$ and $2q - p$, where p and q represent any two *radio* frequencies present in the desired transmission. The fifth-order product frequencies are $3p - 2q$ and $3q - 2p$. These and some higher order products, such as might be produced by distortion in a single-sideband linear amplifier transmitting a two-tone signal, are shown in

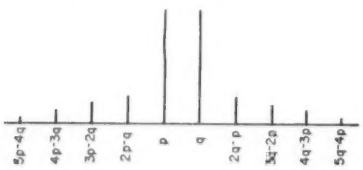


Fig. 1 — Single-sideband distortion products.

Fig. 1. Note that the frequency spacing of the distortion products is always equal to the frequency difference between the two original tones, or legitimate sideband frequencies.

When a linear amplifier is badly overloaded these spurious frequencies can extend far outside the original channel and will cause unintelligible splatter interference in adjacent channels. Splatter of this type is usually of far more importance than the effect on intelligibility or fidelity of the distortion of the original signal. To minimize unnecessary interference, the distortion products falling in adjacent channels should be down as far as we can get them below the signal itself.

Using a two-tone test, the distortion is defined as the ratio of the amplitude of one test tone to the amplitude of the third-order product. This is called the "signal-to-distortion ratio" and usually is given in db. The state of the art in building linear amplifiers has limited S/D ratios to the order of 25 to 30 db. until recently. Within the last few years commercial performance of the order of 30 to 35 db. has been achieved. Recent Collins developments indicate that even 40 db. is possible and practical.

In amateur transmitters where only one voice channel is used, the distortion requirements depend upon the allowable interference to others operating on near-by channels. Factors such as the relative amplitude of the signal with distortion to the amplitude of a near-by signal another amateur is trying to receive enter in. Common courtesy on the crowded amateur bands dictates the use of transmitters with as little distortion as the state of the art reasonably permits.

Causes of Distortion and Methods of Reduction

The principal causes of distortion are nonlinear characteristics of the amplifier tubes and grid-current loading. In order to confine the generation of distortion substantially to the last stage or two, all other stages are usually operated Class A. The plate current curve of Class A amplifier tubes in general can be represented by a simple exponential curve as shown in Fig. 2A. The distortion is kept low by operating the tube in the most linear portion of its plate current characteristic and by keeping the signal level low. Fig. 2B shows the nature of the linearity curve of a typical Class A amplifier. The curvature is

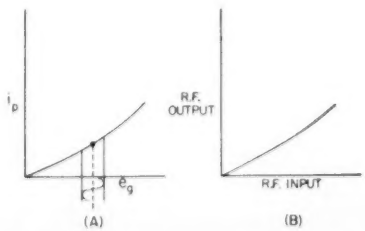


Fig. 2 — Effect of nonlinear plate characteristics.

* Engineering Division, Collins Radio Co., Cedar Rapids, Iowa.

greatly exaggerated since for S/D ratios of the order of 50 db., it cannot be detected visibly.

Class AB amplifiers usually have a very similar curvature. When the linearity characteristics of a series of cascaded amplifiers have similar curvatures, the distortion products generated by each add together in phase.

When amplifier tubes are driven into the grid-current region, the resulting grid-circuit loading causes the linearity curve to droop at large signal

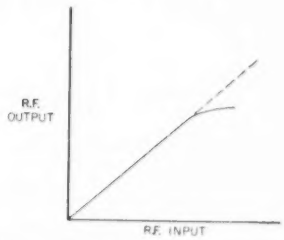


Fig. 3 — Effect of grid loading on linearity.

levels as shown in Fig. 3. The distortion products from this type of curvature are 180 degrees out of phase with those previously discussed. When both types of curvature exist, the distortion products tend to cancel as shown in Fig. 4. When this happens, the fifth order product is usually stronger than the resulting third in the region of

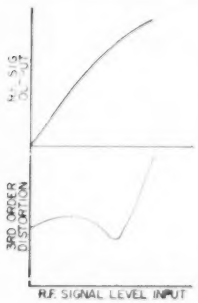


Fig. 4 — Distortion cancellation.

cancellation. For this reason, the value of distortion cancellation is not as great as it might seem.

The nonlinearity caused by grid-current loading is a function of the regulation of the grid driving source. The regulation of linear amplifiers with a varying load is poor in general. It is common practice to use a swamping resistor in parallel with the varying grid load, and to obtain satisfactory regulation it is usually necessary to absorb about ten times as much power in this swamping resistor as the grid consumes.

Another way of providing a low driving impedance is to use a very high resistance driver tube, such as a tetrode or pentode, and an impedance-inverting network.[1] The impedance-inverting network can be a quarter-wave or 90-degree network coupling the driver plate and power-amplifier grid tank circuits. Inductively-coupled tank circuits also have this property. Fig. 5 shows these two circuits. The disadvantage is that it is difficult to maintain proper coupling without special adjustment, and these circuits are seldom used in commercial general frequency coverage transmitters for this reason. Link coupling as used between exciter and final amplifier in many transmitters has this property also, if the line between the links is a small fraction of a quarter wavelength long. (This may explain why some rigs work as well as they do!)

It is apparent that it is best to choose tubes and operating conditions for low grid driving power. Tubes are available that will operate Class AB_1 at power levels up to 500 watts, and

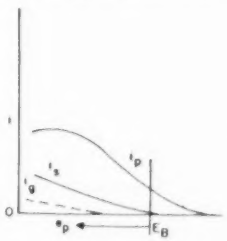


Fig. 6 — Instantaneous plate current characteristic.

their use greatly simplifies the driver and bias regulation requirements.

In cathode-driven amplifiers the total grid and screen driving power should not exceed 10 per cent of the fed-through power at maximum signal level. For S/D ratios better than 30 db., it should be correspondingly less.

The plate current of all tubes drops off when the instantaneous plate voltage is low. Fig. 6 shows a typical plate-current curve taken along a straight load line on constant-current curves. The grid and screen currents are also shown. Two effects seem to cause the drop in plate current; the principal one is that current taken by the grid and screen is "robbed" from the plate, and it can be observed on tube curves that the plate-current lines depart from straight lines by approximately the amount of the grid and screen

[1] Green, "Design of Linear Amplifiers for Single-Sideband Transmitters," *Marconi Review*, Vol. 10, pp. 11-16, January and March, 1947.

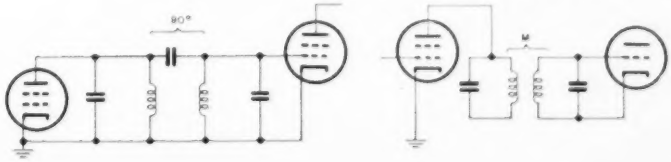


Fig. 5 — High-resistance driver and impedance-inverting network.

current. The amount of screen current and drop-off of plate current also depend upon the tube geometry. In all but a few transmitting tubes the plate can swing well below the screen voltage before plate saturation takes place, and when the plate swings down in this region the plate current drops off quite a bit. If the distortion requirements are not too high, the high plate efficiency realized by using large plate swings can be utilized. Fig. 7 shows a typical linearity curve

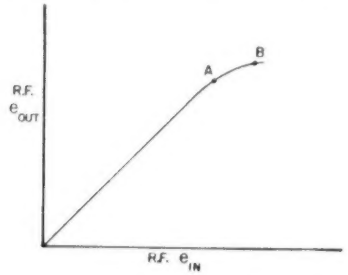


Fig. 7 — **Linearity curve of typical tetrode amplifier.**

of a tetrode linear amplifier. At point *A*, the plate is swinging down to the screen voltage. At point *B*, it is swinging well below the screen and is approaching the grid voltage to the point where saturation or plate-current limiting takes place.

Estimating Distortion

A means of estimating distortion in a power amplifier is quite useful, and the approximate signal-to-distortion ratio of a two-tone test signal can be obtained from the linearity curve. Equations have been developed for calculating this,

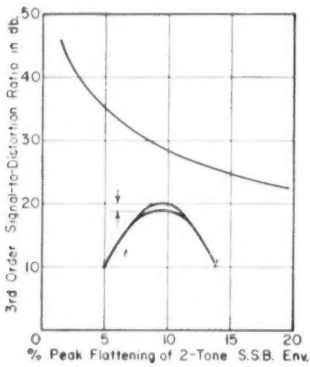


Fig. 8 — **Relationship between third-order distortion and envelope peak flattening.**

and are used to plot the curve in Fig. 8. This curve shows the distortion resulting from flattening of the envelope peak.

Distortion in the lower part of the linearity curve is due to incorrect voltages on the tube elements. It can be substantially eliminated by proper adjustment of bias, screen and plate voltages, so means of estimating distortion from this cause will not be discussed.

Envelope peak flattening which is due to grid current loading and plate current nonlinearity at

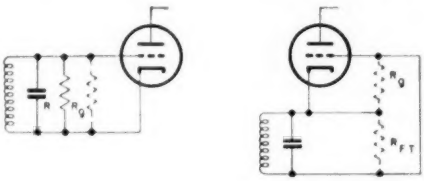


Fig. 9 — **Grid loading. A — Grounded-cathode input circuit; B — Grounded grid.**

large plate swings is often the major cause of distortion. The amount of envelope peak flattening due to grid current loading may be easily calculated. See Fig. 9. The equivalent grid load resistance R_g in Fig. 9 is calculated from the grid driving power and the r.f. grid swing.

$$R_g = \frac{e_g^2}{2P_g}$$

where e_g = peak r.f. grid voltage, and
P_g = grid driving power = $e_g I_c$, where
I_c = d.c. grid current in amperes.

The resistance of the swamping resistor, R, is known or can be chosen for the calculation. The equivalent resistance of R and R_g in parallel is then calculated by:

$$R_{eq} = \frac{RR_g}{R + R_g}$$

If the source impedance looking back at the driver stage is very high compared with R, it will contribute little toward improving the driving voltage regulation. In this case, the grid voltage will be reduced on the envelope peak by the amount of reduction from R to R_{eq}.

$$\text{Peak flattening} = \frac{R - R_{eq}}{R} \times 100 \text{ (per cent)}.$$

The resulting distortion can then be found using Fig. 8.

The calculation is made in a similar manner for cathode-driven amplifiers. Use the equivalent resistance, R_{fb}, of the fed-through power at the cathode in place of R in the above equations. In tetrode cathode-driven amplifiers the grid and screen driving power should both be considered in calculating R_g.

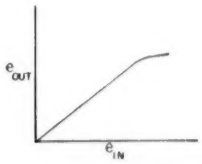


Fig. 10 — **Linearity curve with plate saturation.**

Usually the third-order distortion component is at least 6 db. greater than the fifth- or higher-order components, but a sharp break in the line-

arity such as might be caused by plate-voltage-swing saturation, as shown in Fig. 10, will contain more fifth- and higher-order components than if it were a smooth curve. This type of nonlinearity is particularly objectionable because of the wide band over which the distortion products appear.

The other principal type of nonlinearity is caused by the exponential plate-current characteristic of the tube. Fig. 11 shows such a curve. As stated earlier, this type of curve is obtained with Class A amplifiers. The distortion is kept

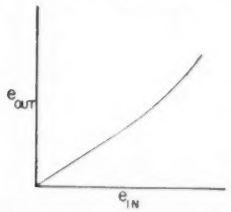


Fig. 11 — Nonlinearity due to exponential plate current characteristic.

low by proper tube choice and by operating at a low signal level over the most linear portion of the curve. In Class AB amplifiers, the use of the optimum value of static plate current will do most toward reducing this type of nonlinearity. A smooth curve of this type usually contains mostly third-order distortion products. Even though the third-order products may be high, the bandwidth over which significant higher order products appear may be relatively narrow. Compound curves such as the one shown in Fig. 12 have relatively stronger fifth- and higher-

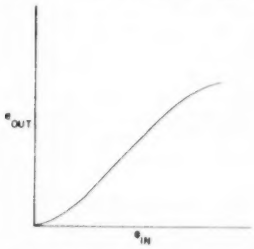


Fig. 12 — Linearity curve with compound curvature.

order distortion components because the third tends to be canceled as previously shown in Fig. 4.

Distortion Measurements

Distortion measurements are of particular importance in single sideband. The power output is often defined as the maximum peak envelope power output obtainable with a specified signal-to-distortion ratio. The distortion rises rapidly when the power amplifier is overloaded, and so has a considerable bearing on the power rating. A plot of the *S/D* ratio *vs.* peak envelope power is an excellent way of showing a transmitter's distortion and power capabilities. A typical curve is shown in Fig. 13. Two tones of equal amplitude are used for nearly all measurements in order to provide a "modulation envelope."

There are several different methods of indicating or measuring distortion, and each has a separate field of usefulness. The "Linearity Tracer" described below is especially useful for quick observation of amplifier operation as the effect of various adjustments can be instantly observed. This instrument consists of two s.s.b. envelope detectors with the output of one connected to the horizontal input of an oscilloscope and the

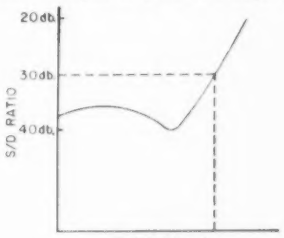


Fig. 13 — Signal-to-distortion ratio *vs.* power output.

output of the second connected to the vertical input.

Fig. 14 shows a block diagram of this instrument connected to a power amplifier. A two-tone test signal is normally used to supply a single-sideband modulation envelope but any modulating signal that provides an envelope varying from zero to full amplitude can be used. Even speech modulation gives a satisfactory trace, so this instrument is unique in that it is an excellent visual monitor. It is particularly useful for monitoring the signal level, and clearly shows when the amplifier under observation is overloaded. The linearity trace will be a straight line regardless of the envelope shape if the linear amplifier has no distortion. Overloading causes a sharp break in the linearity curve. Distortion caused by too much bias is also easily observed and the adjustment for low distortion can easily be made.

Another unique feature is that the distortion

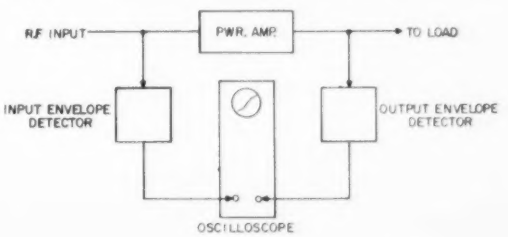


Fig. 14 — Block diagram of linearity tracer.

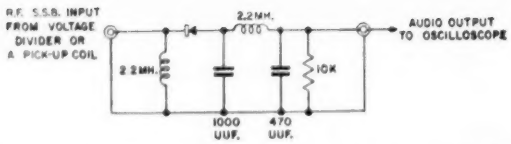


Fig. 15 — Envelope detector.

of each individual stage can be observed. This is helpful in troubleshooting. By connecting the input envelope detector to the output of the s.s.b. generator, the over-all distortion of the entire r.f. circuit beyond this point, including any mixer stages, is observed. It can also serve as a voltage indicator which is useful in making tuning adjustments.

Fig. 15 shows the circuit of an envelope detector. A germanium diode is used as the rectifier. Any type can be used, but the one used in the input detector must be fairly well matched to the one in the output detector. The detectors are not linear at low signal levels, but if the nonlinearities of the two detectors are matched the effects of their nonlinearities on the 'scope trace are canceled. Diode differences are minimized by using a diode load of 5000 to 10,000 ohms, as shown in the schematic. It is important that both detectors be operated at approximately the same signal level so their differences will cancel more exactly. Although they will operate well on r.f. voltages below 0.1 volt it is desirable to operate them on voltages above 1 volt, which further minimizes diode differences.

It is convenient to build the detector in a small shielded enclosure, such as an i.f. transformer can fitted with coax input and output

Fig. 16 — Effect of inadequate response of vertical amplifier.

connectors. Voltage dividers can be similarly constructed so that it is easy to patch in the desired amount of voltage stepdown from the voltage sources. In some cases it is more convenient to use a pick-up loop on the end of a short length of coaxial cable.

The frequency-response and phase-shift characteristics of the amplifiers in the oscilloscope should be the same and flat out to at least 20 times the frequency difference of the two test tones. An oscilloscope such as the DuMont type 304H is excellent for this purpose. It has d.c. amplifiers, which are best when monitoring speech because axis shift is avoided. Good high-frequency characteristics are necessary because the rectified s.s.b. envelope contains harmonics extending to the limit of the envelope detector's ability to detect them. Inadequate frequency response of the vertical amplifier may cause a little "foot" to appear at the lower end of the trace as shown in Fig. 16. If it is small, it may be safely neglected.

Another effect often encountered is a double trace as shown in Fig. 17. This can usually be

Fig. 17 — Double trace caused by audio phase shift.

corrected with an *RC* network between one detector and the oscilloscope. Such effects are easily remedied and an accurate linearity trace is not difficult to obtain.

The best method of checking the test set-up is to connect the inputs of the envelope detectors in parallel. A perfectly straight-line trace will result when everything is working properly. One detector is then connected to the other source through a voltage divider chosen to deliver an r.f. voltage amplitude such that an appreciable change in the setting of the oscilloscope amplifier gain controls will not be required. Fig. 18 shows some typical linearity traces. The probable causes and remedies follow:

Fig. 18A: Inadequate static plate current in Class A or Class AB amplifiers or a mixer. Reduce the grid bias, raise the screen voltage, or lower the signal level through mixers and Class A amplifiers.

Fig. 18B: Caused by poor grid-circuit regulation when grid current is drawn or by nonlinear plate characteristics of the tube at large plate swings. Use more grid swamping, lower the grid drive, or change plate loading.

Fig. 18C: Effect of (A) and (B) combined.

Fig. 18D: Overloading the amplifier. Lower the signal level.

Distortion Checking with a Selective Receiver

A fair idea of the *S/D* ratio of the transmitter can be obtained without requiring any equipment beyond what many amateurs already have. The

(Continued on page 186)

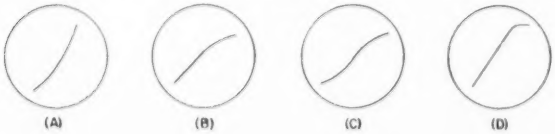


Fig. 18 — Typical linearity traces.

An R.F. Bridge Impedance-Matching Transformer

Simple Circuitry for Balanced- to Unbalanced-Line Transfer

BY LOREN E. GAITHER,* W7CVD

THE need for a low-loss balanced-to-unbalanced impedance-matching device is encountered many times in r.f. work. Baluns of open-wire or coaxial lines, or T or π networks, can and have been used for the purpose, but the r.f. bridge to be described is so straightforward in design and construction that we find it quite attractive. And it has the additional virtue of attenuating harmonics, not an unimportant consideration in these days of TVI.

Primarily, we are interested in a low-loss device to go from coaxial line to Twin-Lead or open-wire line, for both receiving and transmitting conditions. We will assume that we are not interested in the exact degree of phase shift through the device. The bridge can be used in any of the usual applications of a balun, but it must always be remembered that it is a narrow-band (tuned) transformer. Unlike the balun, however, it is not limited in its impedance-transformation.

The circuit is shown in Fig. 1. If one stipulates that R_1 and R_2 are pure resistances, and that $X_{L1} = X_{L2} = X_{C1} = X_{C2}$ at the operating frequency, setting up and solving the network equations indicates that, for proper transformation and balance,

$$X_C = X_L = \sqrt{R_1 R_2}$$

with the output voltage in quadrature with the input voltage. (If one desires to check the solution, we suggest that the resistances of the inductors be included in the initial equations and disregarded in the solution.)

As noted above, to solve the bridge for a desired transformation ratio, $R_2 \div R_1$, we merely take the square root of the product of R_1 and R_2 and then make the reactances X_C and X_L equal to this value at the frequency we intend to use. If the transformer is to be used at several frequencies, X_C and X_L both should be variable. To obtain the values for C and L we may use reactance charts or the formulas:

$$L = \frac{X_L}{2\pi f}, \quad C = \frac{1}{2\pi f X_C}$$

where X is in ohms, f in Mc., L in μh., and C in μf.

Suppose we wish to use 50-ohm coaxial cable from our equipment and to match this, without appreciable loss, to a balanced 300-ohm Twin-Lead transmission-line load at 14.25 Mc. We note that X will be the square root of

(Continued on page 140)

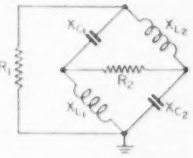
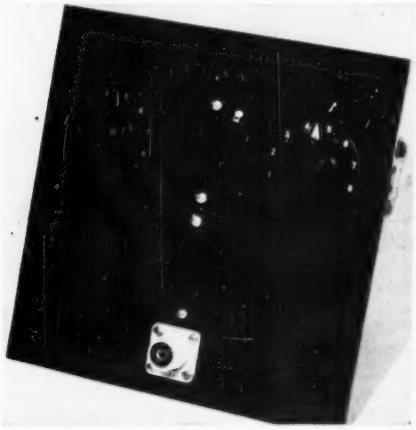
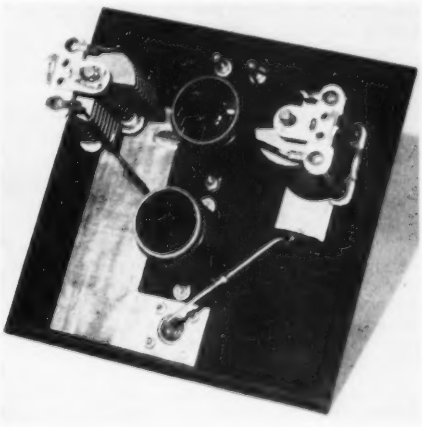


Fig. 1 — A bridge matching circuit for working between an unbalanced line (R_1) and a balanced line (R_2).

* Colonel, SC, 2 Marconi Road, Evans Signal Laboratory, Belmar, N. J.

Two views of a bridge matching circuit used to match 50-ohm coaxial line to a 300-ohm balanced line at 14 Mc. The components are mounted on a panel of insulating material, and copper strap is used for low-inductance leads.





Simplified "Break-In with One Antenna"

BY E. D. CRAWFIS,* WØLLQ

A RECENT article [1] by W2JXM caused much rejoicing at WØLLQ. It was just what this old brass-pounder had been looking for these many years — a complete break-in system with one antenna and no relays.

A careful count of the tubes, especially such gold-plated items as the 6AS7, temporarily cooled the initial enthusiasm. Some serious head-scratching was undertaken, and after the usual blunders had been eliminated, the circuit shown in Fig. 1 resulted.

It might be well to stop at this point and review briefly just what this system accomplishes. First of all it uses the principle of differential keying, in which the oscillator is "turned on" slightly before the keyed amplifier, and held on for some predetermined time interval after the key is opened. The amplifier keying may then be "shaped" to provide any desired characteristic, thus giving a transmitted signal free from both clicks and chirps, and at the same time the backwave from the oscillator is eliminated to permit full break-in operation. Next, the antenna circuit of the receiver is opened the instant the key is closed and before the transmitter is putting out power, so that the receiver input circuits are protected. And last, the receiver may either be silenced completely or have its gain reduced to any desired level while the key is down, to prevent overloading by the transmitter.

Circuit Details

The system may be broken down into its functional elements as follows:

1) A control unit that furnishes positive and negative gating voltages with the proper time delays to the rest of the system. This control unit has been reduced from three twin triodes in the original unit described by W2JXM to one twin triode.

2) An antenna switching tube that opens the coax line to the receiver when the key is closed. This circuit has been simplified somewhat over the original by feeding the control voltage to the grid instead of the cathode, but this has been done at considerable sacrifice in power-handling capability.

3) A receiver gain clamp to silence the receiver under key-down conditions. The expensive 6AS7 in this circuit has been replaced by a 6AQ5, or it may be eliminated completely with most receivers by feeding the negative gating voltage to the receiver a.v.c. line for muting.

As explained by W2JXM in his original article, several variations of the system are possible, to take care of the requirements of different installations. The circuit shown in Fig. 1 is used at WØLLQ, where the receiver is a 75A-2 and the transmitter runs about 120 watts input. The transmitter frequency is controlled by an all-band conversion exciter in which a 12AT7 Clapp oscillator and a 6BE6 Class A mixer are the keyed stages. Some of the possible modifications of the system will be discussed later.

Referring to Fig. 1, R_1, R_2, and C_1 make up the time-constant network that "shapes" the keying. Under key-up conditions, cut-off bias is applied to the grid of the keyed stage of the transmitter and to the grid of V_1. Since no current can flow in its 50,000-ohm plate load when V_1 is cut off,

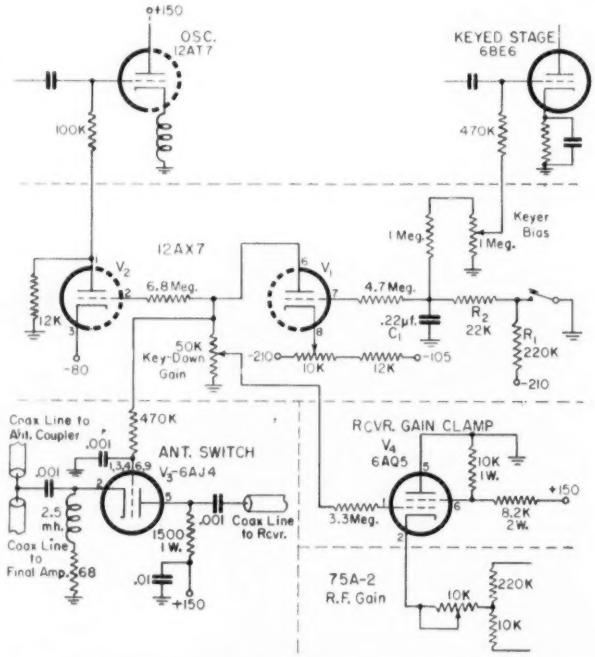


Fig. 1 — The complete break-in keying system. All resistors ½-watt unless otherwise specified. All capacitances in μf.

* % Collins Radio Company, Cedar Rapids, Iowa.

[1] Puckett, "Break-In with One Antenna," *QST*, March, 1954.

V_1 is not furnishing bias to the grids of the antenna switch and the receiver gain clamp, and the receiver operates normally. The grid of V_2 is at ground potential under these conditions, and the plate current of V_2 flowing through the 12,000-ohm load resistor produces a −15 volts to bias the oscillator grid to cut-off.

When the key is closed, C_1 discharges through R_2, and the grid of V_1 falls from slightly beyond cut-off to less than cut-off, allowing plate current to flow almost instantaneously. The negative bias thus produced across the 50,000-ohm plate load immediately cuts off V_2, V_3 and V_4, which turns on the oscillator, opens the antenna circuit to the receiver, and mutes the receiver. At the same time, the bias on the grid of the keyed stage will fall at an exponential rate determined by C_1 and

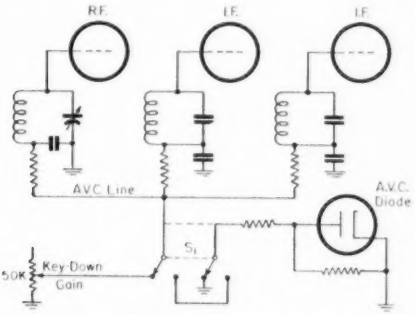


Fig. 2 — An alternate gain-clamp system for a receiver using cathode-circuit manual-gain control. The receiver's a.v.c. line must be broken and the switch S_1 added.

R_3, causing the leading edge of the transmitted character to be rounded.

When the key opens, C_1 charges through R_1 and R_2, causing the negative bias on the keyed stage to increase gradually, thereby "tapering" the trailing edge of the transmitted character. This same negative voltage is applied to the grid of V_1, but since its cathode is at a rather high negative potential its grid has to fall to almost the full −210 volts before it is cut off, removing the bias from V_2, V_3, and V_4. This means that the oscillator will not be turned off and the receiver "unmuted" until after the keyed stage is completely cut off.

It will be noted that there are rather large values of resistance in series with three of the grids in the circuit. During operation of the system these grids are driven positive, and the resistors are used to prevent large grid currents from flowing.

Controlling the grid instead of the cathode of the antenna switch eliminates the need for a separate filament transformer and an additional d.c. amplifier to drive the switching tube. However, as stated before, this limits the power level the 6AJ4 can handle because of the lower bias applied. With the bias available, a maximum of about 100 watts of r.f. power in a *matched* 50-ohm coax can be handled. For higher powers, the original antenna switch circuit can be used. Probably the grid of the second stage of the original 6BL7 d.c. amplifier could be driven from the plate of V_1 (through a series resistor of several megohms). This would provide the correct polarity of gating voltage. For those with thin pocketbooks, a 12AT7 or similar triode can probably be made to operate about as well as the 6AJ4. The author just happened to have one of the latter, or he would have investigated the possibility of this substitution more closely.

• Here is c.w. at its best: break-in with one antenna and chirp-free keying. WØLLQ liked the idea as first presented some months ago by W2JXM, and here is how he simplified the arrangement to fit his own needs — and possibly yours.

Now for a few words concerning the receiver gain clamp tube. A screen-grid tube has been used here instead of the low plate resistance triode in the original circuit. The necessary low plate resistance has been obtained through the simple trick of operating the pentode down on the steep part of its characteristic plate curve by running the screen at a higher potential than the plate. The author feels that this is a very useful but rather neglected little trick, with many applications, such as screen clampers, keyer tubes, etc.

Possible Variations

It has been mentioned that the keyed amplifier in the transmitter is a Class A stage. It is necessary that the keyed tube draw no grid current, since this would prevent proper functioning of the control tube, V_1. If the exciter does not have a Class A buffer in its tube line-up (and most exciters do not), it will be necessary to use a keyer tube in series with the cathode of the Class C stage it is desired to key. The grid of the keyer tube may be connected directly to the arm of the 1-megohm keyer bias potentiometer. This keyer tube, by the way, would be an excellent spot for the pentode circuit mentioned in the preceding paragraph.

Fig. 1 shows the application of the gain clamp tube to the 75A-2, a receiver that is somewhat out of the ordinary in that the r.f. gain control varies the negative bias on the grids of the r.f. and i.f. stages. In a receiver where the r.f. gain is varied by controlling the resistance in series with the cathodes of these stages, the cathode of the gain clamp tube should be grounded and the plate connected to the end of the r.f. gain control which formerly went to ground. The simplest way to accomplish receiver muting, in a receiver that has a standard a.v.c. system, is to run the negative gating voltage directly to the a.v.c. line of the receiver, thus eliminating the gain clamp tube completely.[2] To do this, the connection between the a.v.c. diode and the a.v.c.

(Continued on page 142)

[2] See Miller and Meichner, "TVG — An Aid to Break In," *QST*, March, 1953.

The CD-10-TC

A 10-Meter Transmitter-Converter for Mobile C.D. Work

BY W. W. DEANE,* W6RET/KR6MO

• W6RET finds this 10-meter mobile unit a simple and inexpensive means of equipping a car for active c.d. participation. In small space, the unit includes not only a 6-watt transmitter, but also a crystal-controlled converter that can be fed into the standard car b.c. receiver.

MANY amateurs, it appears, do not actively participate in local civilian defense nets because of equipment cost and general complexity of installation. Included also may be the XYL's resentment of a car full of radio gear eliminating her leg room or the car-trunk space. If any of the above represent your particular problem the CD-10-TC (Civilian Defense Ten-Meter Transmitter-Converter) offers a compact, simplified and economical solution to equipping your car for active c.d. participation.

The Circuit

To achieve the above objectives the transmitter-converter circuit of Fig. 1 was selected and designed so as to be used with the present car-receiver power supply, thus eliminating one costly item. In the transmitter section a 6AQ5 operates as a grid-plate crystal oscillator, and another 6AQ5 is used as the final amplifier with a pi-network output circuit. Another 6AQ5 is used as the modulator tube, which also provides the necessary microphone voltage by means of a cathode-resistor network.

The converter is of the broad-band crystal-controlled type[1] wherein the car receiver acts as a variable i.f. amplifier. This system normally allows a one-megacycle coverage of the ten-meter band, the car receiver tuning from 550 to 1550 kc. Therefore, a crystal must be selected for the mixer oscillator that permits coverage of that part of the band in which your c.d. net operates. The mixer oscillator operates at the fourth harmonic of the crystal, so a 7000-kc. crystal will allow operation from 28.55 to 29.55 Mc. and a 7040-kc. crystal will allow coverage from 28.71 to 29.71 Mc. The coverage of any crystal between 7000 and 7040 kc. can be determined by multiplying the crystal frequency by four, and adding the upper and lower tuning limits of your car receiver.

The 6AK5 operates as an r.f. amplifier with its grid coil, L_2, tuned to the low end of the band, and the plate coil, L_3, tuned to the high end of the band to provide broad-band coverage. If desired, the coils may be peaked on the c.d. net frequency. The 6J6 operates as the mixer and crystal oscillator. L_{4A} is tuned to 28 Mc. with the 30-$\mu\mu$f. trimmer C_1 or, if desired, the trimmer may be eliminated, and coil L_4, used with the circuit and tube capacity, will resonate at 28 Mc. RFC_1 and RFC_2 consist of a 2.5-mh. 4-pie choke with the lead between the second and third pies broken and connected to B-plus. Each end of the choke then connects to one plate of the 6J6.

A d.p.d.t. relay, K_1, provides the dual function of switching the antenna between transmitter and converter, and transferring the high voltage between the transmitter and receiver. The filament wiring is such that the converter and transmitter are turned off when S_1 is in the b.c. position.

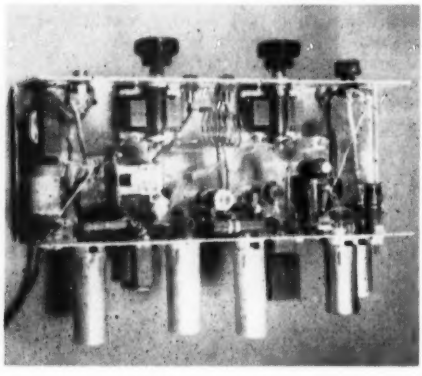
Construction

The transmitter-converter is constructed in a $2\frac{1}{2} \times 4 \times 10$-inch aluminum chassis box (ICA type 29425 "Channel-Lock"). The general construction, layout and wiring details are adequately indicated by the accompanying photographs except, perhaps for the tube layout which is illustrated in Fig. 2. All filament and high-voltage wiring should be done with shielded wire and by-passes applied, as recommended in the TVI chapter of the ARRL *Handbook*. C_6 is a 100-$\mu\mu$f. mica condenser. Its leads are formed into a small coil, L_7, to series resonate in a local TV channel for minimizing TVI. Its resonant frequency can be checked with a g.d.o.

♦

* 4524 Fountain Ave., Los Angeles, Calif.

[1] Deane, "Simplifying the 10-Meter Crystal-Controlled Converter," *QST*, Nov., 1952.



Bottom view of the 10-meter transmitter-converter for c.d. work. This view, along with the sketch of Fig. 2, should indicate the distribution of components on the chassis.

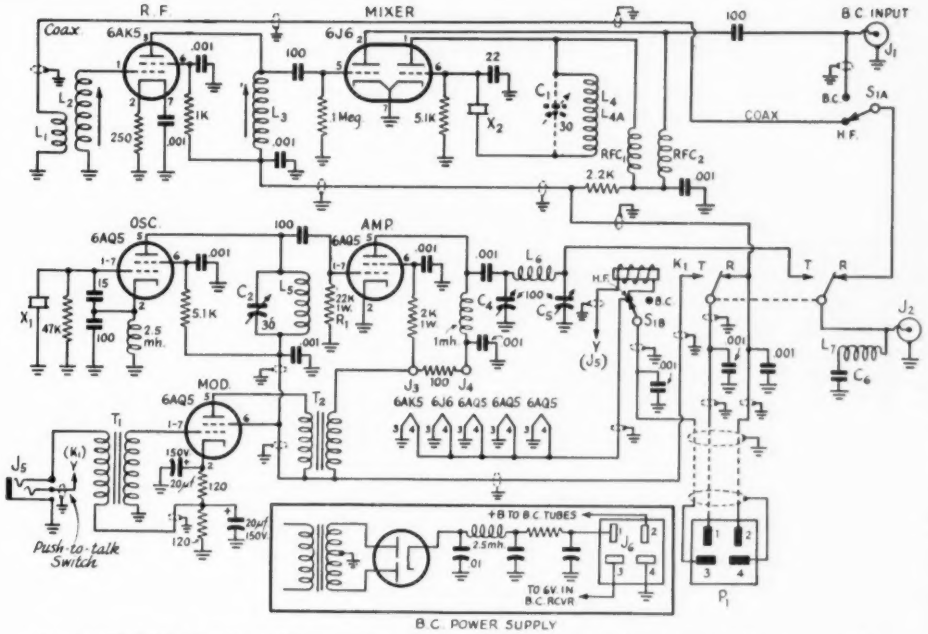


Fig. 1 — W6RET's 10-meter mobile transmitter-converter. Inset shows alterations in car-receiver power supply.

C_1, C_2 — 30-$\mu\mu$f. mica trimmer (C_1 used only with L_{4A}).
C_4, C_5 — Midget variable.
C_6 — See text.
L_1 — 3 turns, small hook-up wire, wound over ground end of L_2.
L_2, L_3 — 18 turns No. 30 enam., $\frac{3}{8}$-inch diam., close-wound, iron-slug form.
L_4 — 28 turns No. 30 enam., $\frac{3}{8}$-inch diam., close-wound (no slug).
L_{4A} — 16 turns No. 22 enam., $\frac{3}{8}$-inch diam., close-wound (no slug).
L_5 — 27 turns No. 22 enam., $\frac{1}{2}$-inch diam., $\frac{3}{4}$ inch long, close-wound.
L_6 — 6 turns No. 16 enam., $\frac{3}{4}$-inch diam., $\frac{3}{4}$ inch long.
L_7 — See text.
J_1, J_2 — Phono jack (RCA type).
J_3, J_4 — Pin jack.
J_5 — 3-contact microphone jack.
J_6 — 4-contact connector (Jones S1304-AB).
K_1 — Midget 6-volt d.p.d.t. relay.
P_1 — 4-contact plug (Jones P-304-CCT).
S_1 — D.p.d.t. switch (Centralab 1462).
T_1 — Microphone transformer (Triad A1X).
T_2 — Modulation transformer (Triad M1X).
X_1 — 7000–7040 kc. crystal (see text).
X_2 — 7-Mc. range crystal for 10-meter operation.

NOTE: All capacitance less than 0.001 μf. are shown in $\mu\mu$f. All capacitors, unless otherwise specified above, are disk ceramic. All resistors, unless otherwise marked in diagram, are $\frac{1}{2}$ watt.

Car-Receiver Modification

To provide power for the transmitter and converter from the car-receiver vibrator supply, the power-supply wiring is modified as shown in Fig. 1. This modification merely consists of breaking the high voltage at the point where it leaves the power supply, and connecting it to a suitable socket, J_6, on the back of the car receiver. The high voltage is then wired, via P_1, through the relay, K_1. Thus, when K_1 is in the nonenergized position, the high voltage from the supply is applied back to the car receiver through the normally-closed contacts of the relay. When the relay is energized, the high voltage is removed from the car receiver and applied to the transmitter. This arrangement is necessary, since the car-receiver supply will not carry the combined load of the transmitter and receiver. It will also be noted that when K_1 is not energized, the high voltage is applied to the converter to allow its operation in conjunction with the car receiver. To reduce hash from the vibrator supply, a filter network consisting of a 0.01-μf. 600-volt paper condenser

(Continued on page 144)

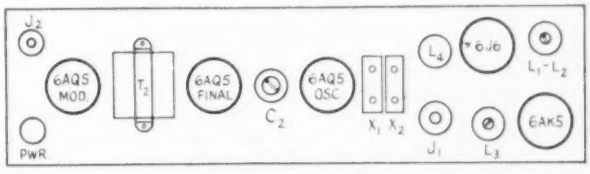


Fig. 2 — Sketch showing general layout of components along rear of chassis.

Fulminatin's from Ol' Fogey

• This diatribe on operating was brought to our attention by Virginia SCM John Carl Morgan, W4KX.

DEAR SONNY:

Used to be when a feller started yearning too much for the good ol' days he's probably have "had it"; might be he was even beginning to suspect there wasn't too much future to look forward *to*. Now mind you I'm not admitting I'm a has-been, but I sure do confess a hankerin' to hear just once more the buzz saw whine from a sync rotary gap. Shucks, even wish I could be limber enough to clamber over roofs and the like to drape some copper wire, but you might know that involves too-painful rediscovery of sundry long-unused muscles and joints.

Oh for a modern-day T.O.M. to "have at" some of the inane operating practices fouling up the ham bands. Boy, wouldn't Hiram Percy Maxim have had himself a ball if he could have heard some of the goofy operating that crawls from under the kilocycles these days.

Set yourself by the receiver, Sonny boy, for a real critical listen. Don't matter what band or mode, but I reckon you'll hear plenty to curl your hair, provided you've got any left. If you want

a couple or three sickening examples of the little horrors at large, just unbutton the flaps on those shell-pink ears:

Exhibit A: Meet our little pet who wants to make WAS the quick easy way — the micromind who "reports" into a busy traffic net (the busier the better) just when things are beginning to roll. He hasn't any traffic, of course, and as a matter of fact he'll usually weasel out of taking traffic for his own town should it be offered. All he wants to know is whether there's a station in the net from Utah or Vermont, whichever state he happens to be on the prowl for at the moment. If there is, don't you believe for a minute that the NCS can put him off with a promise to let him at such station after the net business is completed. Oh no, this bird brain has much more important fish to fry. After all, there's only 15 minutes before another net he wants to honor with his presence closes its session. If he does agree to wait, he's sure to break in every now and again just to be sure the NCS hasn't forgotten him. (Ain't it odd how these goons are almost always S9 while the poor egg with the full message hook is usually Strength four?)

Exhibit B: How's about listening in on a 'phone net and the large number of souls bustin' their jaws trying to do things the hard way. These poorly-guided critters, including the lads and lassies who wouldn't be caught dead with a *key* in the shack, treat perfectly intelligible plain language as if it were leprosy and seem content to stagger along with Q signal substitutes. Far be it for me to disparage the use of the Q code; it's just the ticket for it's intended purpose, that of speeding up code (ugh!) operation. But *why?* WHY? by the Great Horned Spoon does a guy with a mike in his hot little hand feel obligated to follow the leader with "Cue Are You," or if he's really whirling, "Queen Roger Uncle"? Playmates, with *that* kind of procedure traffic ain't all he ain't

got. Now shucks, what's so hard to say about "No traffic"?

Exhibit C: Now Sonny you go fix yourself a hooker of bicarb while we post-mortemize this same specimen (or any of his ilk) when they *do* have a message or two; or as they might phrase it "Cutie See Two."

Our hero clears his throat (audibly) and proceeds in this execrable fashion: "Follows Nan Roger Umpteen. . . ." Yes, that's what the man said — "Nan Roger"!!! Now wouldn't you think anybody who ever handled a message would *know* every message has or should have a number? Wouldn't you feel it unlikely that a plain everyday word like *number* would hardly be misunderstood in such a context? Sonny, this assumption appears to be unwarranted. This jughaid (and I'm afeared his name is legion) not only feels constrained to use the telegraphic abbreviation of NR but is further compelled by using phonetics to complicate what shouldn't have been very involved in the first place. (My guess is this dim

(Continued on page 146)

Sideband Filters Using Crystals

Designing Lattice and Half-Lattice Crystal Filters

BY RICHARD F. BURNS,* W9NVC

INTEREST in single-sideband transmission and the relatively plentiful supply of FT-241-A crystals has led many amateurs to attempt the construction of bandpass filters using crystals. The technique of generating single-sideband signals by means of a balanced modulator and a bandpass filter is common knowledge to many amateurs today; however, the theory and techniques necessary for the construction of an effective bandpass filter are not so well known outside of the telephone company laboratories. Because of the difficulties involved in building a really effective filter by means of the "cut-and-try" method, a discussion of the theory underlying the evolution of several types of bandpass filters, together with specific design equations from which filters employing the surplus market crystals could be constructed, should be of interest to many amateurs.

To be of any value to the man interested in more than the actual construction of a filter, a discussion must contain some mathematics. However, given the design equations, it should be possible to calculate the optimum circuit parameters with only a pencil, paper, and patience. All ought to be long!

Since all of the various filter sections can be reduced to physically-realizable lattice networks by means of network transformations,[1] the theory and design of lattice-type filters will be considered first.

The Lattice Filter

The theory of the lattice-type filter section can best be understood by considering the lattice of Fig. 1A redrawn as the more familiar bridge circuit of Fig. 1B. By tracing through the various arms of both circuits, it can be verified that the two are electrically identical. For reasons that will become evident later, the circuit as drawn in Fig. 1A is most generally employed and will be used in this article.

At first we will be interested only in the so-called "balanced-lattice" network, in which the series arms, Z_1 and Z_4, are equal and in which the lattice arms, Z_3 and Z_2, are equal. This is usually indicated by the dotted lines of Fig. 1C and is mentioned here to obviate any confusion in reading the references given with this article. Until we reach the section on half-lattice filters, when we refer to a lattice in the text a balanced lattice of the Fig. 1C type will be implied.

In a lattice in which the series and lattice arms are composed of pure reactances, it can be shown that the bridge will be balanced and offer the greatest attenuation in a filter using the connections of Fig. 1C when the reactances of the corresponding arms are equal in magnitude and sign. That is, with a signal being fed into the *1*, *2* terminals, there will be a voltage null between the *3*, *4* terminals when the reactance of the arm between *1* and *3* is equal to that of the arm between *1* and *4* and is of the same sign. Similarly for the other arms. The frequency of balance is designated by f_x. The bridge will attenuate when the reactances are of the same sign and will offer least attenuation when the reactances are of opposite sign — theoretically, there will be no attenuation through the bridge if resistance is neglected. This is a somewhat oversimplified statement, in that we usually assume that the generator supplying the a.c. input signal to the filter has an internal impedance equal to the midband image impedance of the filter and that the filter is terminated in its midband image impedance. The voltage is measured with an infinite impedance detector across the output terminals.[2, 3]

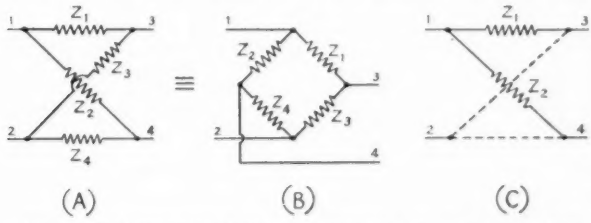


Fig. 1 — The lattice network (A) can be redrawn as the more familiar bridge (B) without changing any of the connections. In work with balanced-lattice networks, where $Z_1 = Z_4$ and $Z_2 = Z_3$, the representation is simplified by drawing the network as in (C).

The reason why the filter passes no power when the bridge is balanced is quite evident — there is a voltage null at that time. However, the reasons for the other conclusions are not obvious at first glance. It can be stated here only that the basis for the above observations regarding the attenuation characteristics of this type of a filter rests upon a somewhat involved

* Beloit Research and Development Company, Box 122, Beloit, Wisc.

[1] Guillemin, *Communications Networks*, Vol. II, Wiley.

[2] Buckley, "Evolution of the Crystal Wave Filter," *J. Ap. Physics*, Oct., 1948.

[3] Mason, *Electromechanical Transducers and Wave Filters*, Van Nostrand.

proof given by Shea[4] for certain types of unbalanced networks. The unbalanced equivalent of the lattice may be treated by Shea's method to effect a proof of the above statements but would be too lengthy to include here.

Fig. 2A shows the attenuation-*vs.*-frequency characteristics of a filter whose unequal arms have the reactance-*vs.*-frequency characteristics of Fig. 2B. This illustrates a special case, in which the configurations of all arms are similar and the values of the components in unequal arms differ slightly. In Fig. 2B the solid line indicates the reactance of the arm *1, 4* from zero to infinite frequency and the dotted line indicates the reactance of the arm *1, 3* over the same frequency range.

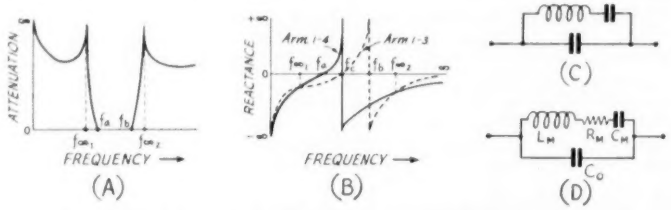


Fig. 2 — (A) The attenuation-*vs.*-frequency characteristic of a filter having the reactance-*vs.*-frequency characteristics of (B). Such reactance characteristics can be obtained by the configuration of (C), which is similar to the equivalent circuit of a quartz crystal (D) if the resistance is neglected.

The configuration that will give such a curve is shown in Fig. 2C. This configuration can be seen to be similar to the equivalent circuit of a quartz crystal (Fig. 2D) if resistance is neglected and, over a limited frequency range, we might find it possible to choose crystals for the lattice arms and obtain a set of curves similar to those of Fig. 2B.

In examining the curves of Fig. 2B it can be seen that we have chosen our circuit parameters so that the series-resonant frequency of arm *1, 3* is the same as the parallel-resonant frequency of arm *1, 4*. This is very fortunate, if we happen to want to use these two arms in a lattice filter circuit, since, as we will remember, we would have a passband between the series-resonant frequency of arm *1, 4* (labeled f_a) and the parallel-resonant frequency of the other arm, *1, 3* (labeled f_b). The reason is that between f_a and f_b the reactances of the arms are opposite in sign and thus satisfy the condition required for a passband. From zero to f_a and f_b to infinity we have reactances of the same sign in both sets of arms, with consequent attenuation in these two ranges. At f_{∞_1} and f_{∞_2} the reactances are of the same sign and equal in magnitude, so our bridge is balanced and we have maximum attenuation.

This particular lattice network, in which the arms are composed of suitably chosen crystals and shunt capacitances, could be (and has been) used as a passband filter. However, it has one drawback.[3, 5, 6] Such a crystal filter is limited in bandwidth to a maximum of about 0.72 per cent of the midband frequency. This would ordinarily limit its use to carrier filters at the medium frequencies where sideband filters are usually employed. However, at the higher frequencies where 0.72 per cent of the midband frequency is on the order of 3 kc., such a filter might be feasible for sideband use.

Just what can be done to widen the possible passband of a lattice filter using crystals? From Fig. 2B we can see that the passband of the filter is limited on the one side by the series-resonant frequency of one set of arms and on the other side by the parallel-resonant frequency of the other arms. To have a continuous passband, we have the added restriction that the series-resonant frequency of the one arm be equal to the parallel-resonant frequency of the other arm. Thus, it can be seen that, if we were able to grind crystals in which the series-resonant frequencies fell further from the parallel-resonant frequencies, our question could be very simply answered. But, there is a limit to what one can do with the crystals in this direction, and that limit is inherent in the quartz.

There is a definite relationship between the ratio of the crystal shunt capacitance, the crystal equivalent motional capacitance, and the frequencies of series and parallel resonance of a crystal. That relationship is best stated by a formula:

$$\frac{f_s^2}{f_p^2 - f_s^2} = \frac{C_o}{C_m} \qquad \ldots\ldots\ldots \quad (1)$$

where f_s = series-resonant frequency of the crystal,
f_p = parallel-resonant frequency of the crystal,
C_o = crystal shunt capacitance, and
C_m = crystal equivalent motional capacitance.[7]

For a given cut of crystal, the ratio of C_o to C_m is practically a constant. It ranges from low to high values as one goes from the X cuts toward the Z cut. For a −18.5° X-cut crystal, for example, the ratio is about 138. For NT-cuts it can be as high as 500. For the CT cut, which is used in the FT-241 crystal, the ratio is approximately 400. Incidentally, the Z cut is mentioned here only to illustrate the change in the ratio — it has no practical value as an oscillator blank since its activity, insofar as

[4] Shea, *Transmission Networks and Wave Filters*, Van Nostrand.

[5] Mason and Sykes, "Electrical Wave Filters Employing Crystals with Normal and Divided Electrodes," *Bell System Technical Journal*, Vol. XIX, April, 1940, No. 2.

[6] Mason, "Resistance Compensated Bandpass Crystal Filters for Use in Unbalanced Circuits," *Bell System Technical Journal*, Vol. XVI, Oct., 1937, No. 2.

[7] Cady, *Piezoelectricity*, McGraw-Hill.

the piezoelectric effect is concerned, is nil.[8, 9]

From Equation (1) it can be seen that by adding additional capacitance to C_0 we would only be making matters worse, insofar as the filter passband width is concerned. Therefore, let us investigate the characteristics of a configuration having inductance in series with the crystal, in an effort to discover how the bandwidth might be widened.

Fig. 3 shows graphically what happens to the arm reactance-*vs.*-frequency curve when we put inductance in series with the crystal. By graphical addition of the curve for the coil reactance to that of the crystal reactance, we arrive at the dashed curve for the crystal and series coil. Note that the parallel-resonant frequency of the crystal and shunt capacitance alone, f_p, falls at the same place as the parallel-resonant frequency for the coil and crystal combination. However, the series-resonant frequency, f_{s_1}, of the crystal alone is not the same

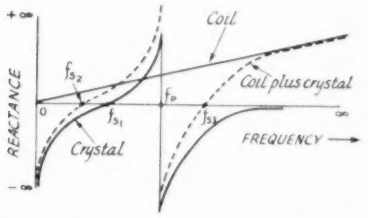


Fig. 3 — The reactance-*vs.*-frequency curve of an inductance in series with a quartz crystal is shown by the dashed line.

as the series-resonant frequency of the combination, f_{s_2}. This is very fortunate, since it is just what we wanted for our lattice circuit. Now, unless something else has happened, we should be able to have as wide a passband with our crystal and coil filter as we desire. But something else did happen!

By adding the coil to the crystal we have introduced a new series-resonant frequency that might cause us some trouble. It is point f_{s_3} in Fig. 3. If we make the coil too large, the coil reactance curve will be so steep that f_{s_3} will move closer to f_p than f_{s_1} was. That would put us right back into a situation similar to the one we started with or one perhaps less amenable. However, a golden mean does exist. In actual practice, using a coil-and-crystal-with-shunt-capacitance combination in each arm of the lattice, the reactance-*vs.*-frequency curves required for a passband from f_a to f_b are shown in Fig. 4A. Fig. 4B illustrates the general shape of the attenuation-*vs.*-frequency curve resulting from such a choice of arms in a lattice filter. The series-resonant frequency of one set of arms is again made to fall at the parallel-resonant frequency of the other set. Since the curve becomes positive twice instead of once (as with

• If you are interested in crystal-lattice filters for receivers or s.s.b. exciters, and you would like to know how to put some of those FT-241-A crystals to work, here is the article for you. It will take some paper work before you warm up the soldering iron, but then filter design of this sort never was a simple problem.

the crystal alone), we are able to choose parameters to have the parallel resonance of the arm indicated by the dotted line in Fig. 4A fall at the series-resonant frequency of the other arm, thereby obtaining a continuous passband from f_a to f_b. As to the possible bandwidth attainable with such a lattice configuration using crystals, Mason[3] has calculated that it is about 14 per cent of the midband frequency for crystals in which the ratio of shunt capacitance to motional capacitance is on the order of 138.

From the above observations it is evident that many other possible combinations of crystals with coils and condensers exist that could provide us with bandpass filters suitable for single-sideband use, as well as high-pass, low-pass, and band-stop filters. However, we shall be content to give equations for only two types of filters in which the FT-241-A crystals could be effectively used.

Design of a Filter Employing the FT-241-A Crystals

For the filter of Fig. 5A, the equations for the circuit and crystal parameters are given in Appendix I (see page 150). In designing a filter around the FT-241-A crystals, the following procedure is suggested:

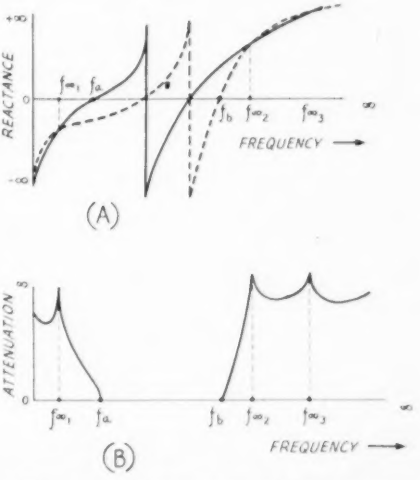


Fig. 4 — Combining two arms, each having reactance characteristics similar to the dashed line in Fig. 3, is shown at (A). This results in the attenuation characteristic of (B). The bandwidth is increased over that obtainable from the circuit of Fig. 2.

[8] Vigoureux and Booth, *Quartz Vibrators and Their Applications*, His Majesty's Stationery Office, London, W. C. 2.

[9] Heising, *Quartz Crystals for Electrical Circuits*, Van Nostrand.

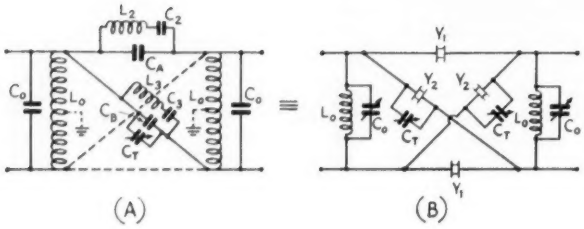


Fig. 5 — The equivalent (A) and actual (B) electrical circuits of a crystal-lattice filter. The symbols refer to values given in Appendix I.

1) Choose values for f_a, f_b, f_{∞_1}, f_{∞_2} in the order of Fig. 4B. It should be mentioned that a compromise has to be made at this point, since the closer f_a is to f_{∞_1} and the closer f_b is to f_{∞_2}, the greater will be the dips in the skirts of the attenuation curve outside the f_∞ points.

2) Calculate the m, s and the A, B and C values, using at least seven significant figures if a 455-kc. filter is contemplated.

3) Calculate the series-resonant frequencies of the two sets of crystals. It is imperative that the two sets of crystals be well paired. The crystal companies supply one crystal with two sets of plating for filter use so as to be sure that the series-resonant frequencies of identical arms will be the same.[5, 6] The mode of vibration used with the FT-241-A crystals precludes the possibility of obtaining good results with divided platings, however, because of the mounting problem. The FT-241-A crystal has only a nodal *point*, while the cuts usually used in filter work (the X cut, −18.5° X cut, and the +5° X cut) utilize a mode of vibration that results in a nodal *line* being produced. Mountings can be attached anywhere along this line, making the use of divided plating feasible with such crystals. Mounting, it should be mentioned, is made at a nodal point to avoid loading the crystal. It should be mentioned in this connection that splitting the plating on a crystal will result in two crystals effectively, having the same resonant frequencies if the plating is divided evenly, but twice the impedance of the original crystal; i.e., $L'_m = 2L_m$, $C'_m = C_m/2$, and $C'_o = C_o/2$. The electrode connections should be made so as to excite the crystal in phase; that is, both electrodes on one side should have the same sign voltage applied, if divided-plating crystals are used.

4) Calculate the motional capacitance and inductance values in terms of Z_o. Since we have started with crystals in which these parameters have been fairly well fixed, this step is taken only to fix a value for Z_o and for determining optimum values for equivalent capacitance and inductance of one set of crystals. We are at liberty to do this, since Z_o is arbitrary so long as the L and C of the crystals have not been fixed. We can use Equation (1) in the text to determine the ratio of C_o/C_m and, consequently, the value of C_m and L_m of the crystals on hand. We can then attempt to make a compromise for Z_o, if we don't want to tamper with the crystal's plating and reduce C_m to agree perfectly with the formulas. As long as the series-resonant frequencies of the crystals agree closely with those of the equations, a departure of up to 1 per cent in the inductance values of the crystals from those given by the equations will still permit a reasonably flat passband insertion loss characteristic to be obtained, although the attenuation outside the passband will not be so great as when the correct values are used.

5) Calculate the other parameters in terms of the Z_o that has now been fixed.

6) Align the filter by first adjusting C_o to resonate L_o near the middle of the passband and then adjusting C_T to fix the position of the attenuation peaks. Now readjust the two C_o trimmers so as to obtain a flat passband insertion loss characteristic. A reading of the Berry,[10] Titt,[11] and Morrison[12] articles will help in establishing an understanding of the problems involved, while the Vigoureux and Booth book[8] gives the procedure used to align complex filters on a production-line basis. If the crystals are correctly paired and the filter is terminated correctly, alignment is a process of minutes.

The above design equations were derived from the more general equations given by Mason[6, 13] for a balanced-lattice filter with shunt coils across the crystals by setting one of the peaks of infinite attenuation f_{∞_3} equal to zero. With this choice of f_{∞_3}, both of the shunt coils become equal in value to L_o in this case, as given in the equations. Now, by means of a theorem due to Mason,[6] if all of the shunt coils in the lattice and series arms of the lattice are equal, they may be removed from the lattice and placed across the input and output of the network, as has been done in Fig. 5. By the same reasoning, it is possible to remove C_o from each arm of the network and place it in parallel with L_o leaving only the electrode-to-electrode capacitance in one set of arms and C_T plus the electrode-to-electrode capacitance in the other set of arms. Here it is assumed that $C_o + C_A$ is equal to the original capacitance across the series arms of the network and that $C_o + C_B + C_T$ is equal to the original capacitance across each of the lattice arms of the network. Since distributed capacitance has been neglected in these design equations, the C_o and C_T capaci-

[10] Berry, "Filter Design for Single-Sideband Transmitters," *QST*, June, 1949.

[11] Titt, "Dual Crystal Q-5er," *QST*, Sept., 1950.

[12] Morrison, "Phone Selectivity for the BC-312," *QST*, Feb., 1954.

[13] Vergara, "Design Procedure for Crystal Lattice Filters," *Tele-Tech*, Sept., 1953

tors have been made variable. The shunt capacitance across each arm of the lattice, of course, includes the crystal shunt capacitance. Design equations for the series-coil type of balanced lattice filter using one crystal in each arm are given later with the discussion of "half-lattice" filters. The series-coil filter is usually used as the prototype filter in the design of the "half-lattice." Z_o for this filter ranges between 10 and 1000 ohms. The possibility of using two crystals in each arm to obtain twice as many attenuation peaks also has been investigated;[3, 14, 15] however, the design equations and alignment procedure are so complicated as to preclude their use by amateurs.

The design of unbalanced crystal filters is also possible, and Mason and Sykes have given several possible circuits for use with single plating or divided plating crystals.[3, 5, 6] Since an equivalent lattice network for any type of symmetric network may be readily obtained by means of Bartlett's theorem, these filters offer no new mathematical problems although bandwidth limitations and alignment procedures may be changed.[1] They will not be considered here, however, and the reader is directed to Cady,[7] Mason,[3, 6] or Sykes[5] for further information, should it be desired.

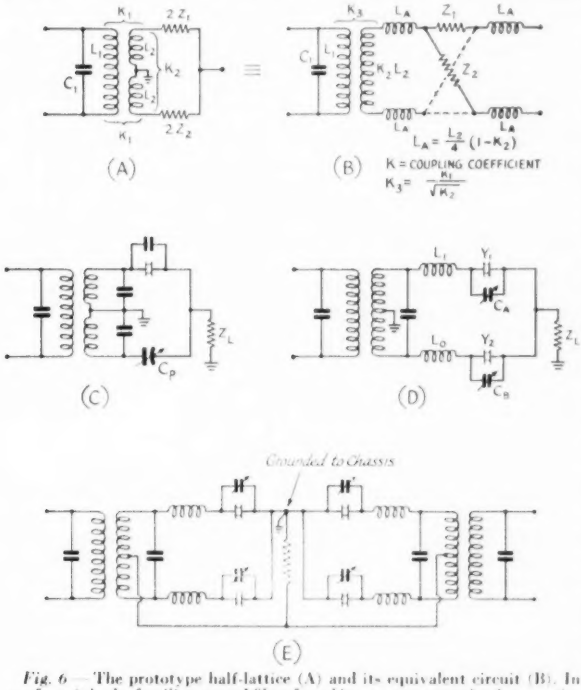


Fig. 6 — The prototype half-lattice (A) and its equivalent circuit (B). In one form it is the familiar crystal filter found in many communications receivers (C). The half-lattice filter with two crystals is shown in (D). Two sections can be cascaded as in (E).

It should be mentioned that, in the event that one section of a filter calculated and constructed from the design equations given in this article does not offer as much attenuation outside the passband as might be desired, it is possible to add as many other sections in tandem as are necessary to produce the required attenuation-*vs.*-frequency curve. One section alone, when the infinite attenuation peaks are not too close to the edges of the passband, will have an insertion loss of approximately 3 db. in the passband region and 40- to 50-db. attenuation at the f_∞ points. Outside the f_∞ points the attenuation, as measured by the signal generator and vacuum-tube voltmeter method mentioned in the sixth paragraph of this article, will be on the order of 25 db. It is common practice in the telephone industry to have a filter with four sections in tandem, in which the f_∞ points are staggered. In this way, 100-db. attenuation relative to the passband attenuation is obtained everywhere outside the f_∞ points. The $f_{\infty 2} - f_0$ difference may be made as small as 200 cycles at 200 kc. with such a filter, assuming a passband of 5 kc.

The Half-Lattice Filter

The prototype half-lattice and its equivalent circuit are illustrated in Figs. 6A and 6B. The half-lattice filter is also known as the "Jaumann section" or "hybrid coil" filter and is probably one of the best known of all crystal filters because one of its derivatives is used in communications receivers, where it assumes the familiar form shown in Fig. 6C.[16]

The three-winding transformer employed in a half-lattice filter having a center-band frequency near 455 kc. is not unlike a push-pull output i.f. transformer, and it consists of two secondary windings that are electrically identical. They are connected "series aiding" and usually are loosely coupled to the primary winding. The transformer with its resonating condensers forms a sort of wide bandpass filter in itself in practice. From the equivalent circuit, it can be seen that the half-lattice filter that uses only two crystals (Fig. 6D) is electrically identical in operation to a full lattice with four crystals. In practice it is possible to achieve the same attenuation-*vs.*-frequency characteristics with a half-lattice that can be obtained with a full lattice. A saving of two

[14] Fromageot and Lalande, "Calculation of Bandpass Filters Using Piezoelectric Crystals in Lattice Structures," *El. Communications*, Vol. 26, No. 4, Dec., 1948.

[15] Herzog, *Siebschaltungen mit Schwingkristallen*, Wiesbaden, Dietrich Press, 1949.

[16] Marrison, Patent 1,994,658, March 19, 1935.

crystals and two coils as well as a material simplification of the alignment procedure contribute to the popularity of this configuration. A further advantage of this type of filter is the ease with which it lends itself to i.f. circuitry — the filter may be used with a balanced or unbalanced input

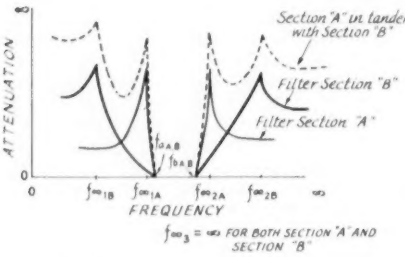


Fig. 7 — By combining in tandem two filter sections, one with sharp cut-off characteristics and one with less sharp characteristics, the composite cut-off and attenuation outside the passband are both increased.

and an unbalanced output. Placing two half-sections "back-to-back," as illustrated in Fig. 6E, results in a configuration identical in performance to a pair of lattice filters in tandem. Usually, in designing such a "back-to-back" filter — or any tandem section filter, for that matter — the passbands of both sections are chosen to be identical and the attenuation peaks are staggered — those of one section being chosen to fall close to the passband edges so as to achieve a sharp cut-off characteristic — those of the other section being chosen further from the passband. This is done to achieve the two desirable characteristics of sharp cut-off and high attenuation outside the passband. The composite result is shown in Fig. 7.

Design Procedure for Half-Lattice Filters

The design procedure for half-lattice filters follows the general plan of the previously-described filter. The first step is as before — calculation of the prototype lattice parameters from the design equations (Appendix II). In designing a half-lattice, the series-coil type lattice prototype is usually used. It is illustrated in Fig. 8. A simplification in the calculations can be had at the price of one attenuation peak if m_3 is chosen equal to f_a/f_b. This results in $f_{\infty 3}$ being moved out to infinity and $L_0 = L_1$ (Fig. 8A).

After the prototype lattice parameters have been determined in terms of Z_0, use is made of the equivalent circuit of Fig. 6 to fix the final circuit parameters. These parameters will still be in terms of Z_0, of course. It should be mentioned that if the secondary-to-secondary coupling is near unity, the coils, L_A, in the equivalent circuit of Fig. 6B may be disregarded.

Now, as in the other filter design procedure, the known value of equivalent circuit inductance of one of the crystals is substituted in the appropriate equation to determine Z_0. Z_0 now being fixed, all of the other circuit parameters may be calculated explicitly. Since the FT-241-A crystals all run approximately the same insofar as inductance is concerned at the same frequency, it will be necessary to modify not only the series-resonant frequency of one of the crystals but also the equivalent circuit inductance and capacitance, if optimum results are to be expected. Within certain limits, the crystal frequency can be changed by plating or grinding — plating increases the equivalent circuit resistance, of course, and as a consequence decreases the crystal *Q*. The equivalent circuit inductance may be increased by scratching off some of the plating near the edge of the crystal — thereby reducing the crystal shunt capacitance and equivalent series capacitance simultaneously.

Alignment is obtained by resonating the transformer input to the center-band frequency and adjusting the transformer secondary condenser to give the flattest passband characteristic. The trimmers on the crystals are adjusted as in the previous filter, the calculated attenuation peak frequencies being convenient check points.

General Design Considerations

One refinement that is frequently resorted to in the half-lattice as well as other types of filters is resistive balancing. It is often found that when one of the inductance coils differs appreciably from the other in value, the addition of non-inductive resistance to the filter arm containing the smaller inductance will result in better filter performance at the attenuation peaks. This resistance should be of such a value as to result

(Continued on page 148)

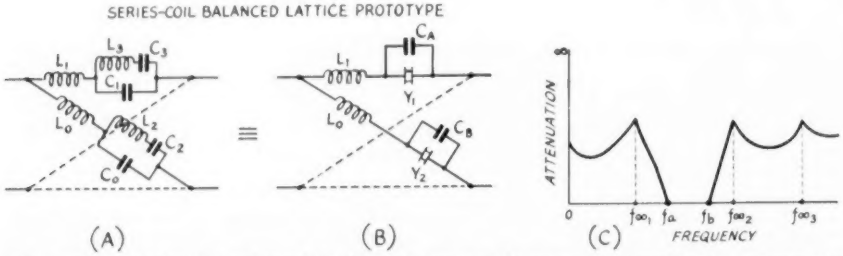


Fig. 8 — The equivalent (A) and actual (B) electrical circuits of the series-coil balanced-lattice prototype filter, used in the design of a half-lattice crystal filter. The attenuation characteristic is shown in (C).

A Step-by-Step Station for the V.H.F. Man

PART II — *A 120-Watt Amplifier for 50 and 144 Mc.*

BY EDWARD P. TILTON,* W1HDQ, AND MASON P. SOUTHWORTH,** W1VLH

LAST MONTH we described rigs for operation on 50 and 144 Mc. at the 15- to 25-watt level. They were made as completely separate units, so that if you are interested in only one of the bands you can build the appropriate rig, and not have to invest in any unnecessary frills that would have made possible the use of a single rig on two bands.

We changed our tactics when we designed the amplifier to go to the next power level, however. The investment you have to make in tubes, parts, power supplies and modulation equipment to build and operate a rig at 100 watts or more is enough so that the extra cost and complexity involved in two-band operation are minor factors. The rig we show here sacrifices little in performance to achieve its multiband capabilities, and its cost is hardly any greater than it would have been for a single-band set-up.

The amplifier can be operated at up to about 125 watts input, 'phone or c.w., on either band. It uses a pair of 6146s, tubes that are fast taking over the job of handling this kind of power in the v.h.f. field since the 829B disappeared from the surplus counters. A novel form of clamp-tube circuit [1] not only keeps the plate dissipation within bounds when drive is removed, but provides a convenient tune-operate control as well. By giving a very flexible control of the screen voltage, it makes possible the operation of the final stage at input levels from 20 to 125 watts. No change has to be made in the amplifier when going from voice to c.w.

Method of Changing Bands

Getting two-band operation with 6146s, when one of these bands is 144 Mc., is not done with ordinary plug-in coils. The input and output capacitances of these tetrodes are too high for that. A plug-in coil base and socket combine enough stray inductance and capacitance so that, with what the tubes have, there's practically nothing left for a conventional coil at 144 Mc.

We get around this problem with a couple of simple dodges. The grid circuit is left untuned. We have enough drive from those 2E26 stages so that precise resonance in the grid circuit is not necessary. Our grid coil is conventional, then, except that we have to use a standard 28-Mc. plug-in coil for the 50-Mc. band. The 2-meter "coil" is a hairpin loop, mounted on a regular 5-pin tube-base type plug. The coil socket is a standard 5-prong ceramic job, mounted so that the leads to the 6146 grids are as short as possible.

A combination of tuned quarter-wave line and plug-in coil tank circuit is used in the plate circuit. The plate line for 144 Mc. is completed at the far end from the tubes with a plug-in device that combines shorting bar and B-plus feed point. The plug-in coil for 50 Mc. is a conventional coil assembly with swinging link. This system makes it necessary to plug in a special coupling loop for 144-Mc. operation. The tuning condenser for the plate circuit is tapped down the line two inches from the plate clips, so it does not load down the circuit as heavily as it would if connected at the plate terminals. At 50 Mc., this tapping-down effect is negligible.

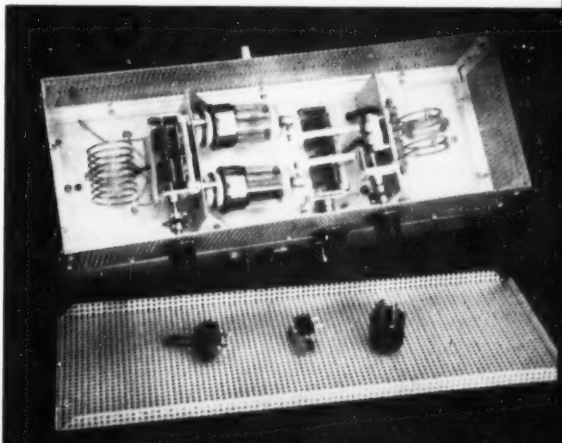
The link terminals of the coil socket and the separate socket for the 144-Mc. coupling link are connected in parallel, so a common series-tuning capacitor takes care of both bands. The neutralization method, involving a split-stator variable condenser connected from screens to ground, is also common to both bands.

Construction

The amplifier is built on a 6 × 17 × 3-inch aluminum chassis, with sides of perforated alumi-

* V.H.F. Editor, *QST*.
** Laboratory Assistant, *QST*.

[1] Beling, "A Protective Circuit for Tetrodes," *QST*, Oct., 1954, page 33.



The push-pull 6146 amplifier for 50 and 144 Mc. The 50-Mc. coils are in place. On the cover in the foreground are the grid coil, the antenna coupling loop and the plate-line shorting plug, all for 144-Mc. operation.

num 3½ inches high. The sides and cover are made in a manner similar to that used in the 2E26 units described previously, except that controls for the screen neutralization, plate tuning and antenna series condensers are brought out through the front. A grid-current jack, a filament toggle switch and the potentiometer for the screen-voltage control are mounted on the front wall of the chassis.

On the back wall are the input and output coaxial fittings, the power connector and the socket for the 12AU7 protective tube. There's not much under the chassis except the filament transformer, the audio choke in the screen lead, a few resistors and power wiring.

Looking down inside the rig we see that two similar aluminum brackets are used for mounting the tubes and most of the parts. These brackets are 4½ inches wide and 2¾ inches high in their folded form. Their dimensions, other than these, are unimportant. The 6146 sockets are mounted 2½ inches apart on the left bracket, with the sockets centered about 1½ inches above the chassis. Note that the sockets are on the *tube* side of this bracket. Three ⅜-inch holes in the bracket under each socket pass the screen, control grid and heater connections. The cathode and cold heater connections are made directly to the bracket on the tube side. This is important from the stability point of view.

The screen neutralizing condenser is held in place by the two screws that also hold the sockets. The grid coil socket, the two screen r.f. chokes and their common 0.001-μf. by-pass are out of sight in the photograph. They are directly below the screen neutralizing capacitor. Obviously, this bracket and its parts comprise a subassembly that must be made in one unit before installation. This bracket is 5 inches from the end of the chassis. The other, containing the sockets and antenna series condenser, is 7¼ inches away from the first one.

Note that the plate tank condenser, C_2, is mounted on a polystyrene plate, to prevent grounding the rotor. Experience in the past has indicated that grounded rotors in such applications can very easily introduce parasitic resonances and oscillation troubles, usually around 300 Mc. or so in a layout like this one. Controls for all three variable condensers are brought out through insulated flexible couplings.

The perforated aluminum cover is made and mounted similarly to those used on the exciter units. It is recommended that the cover be made

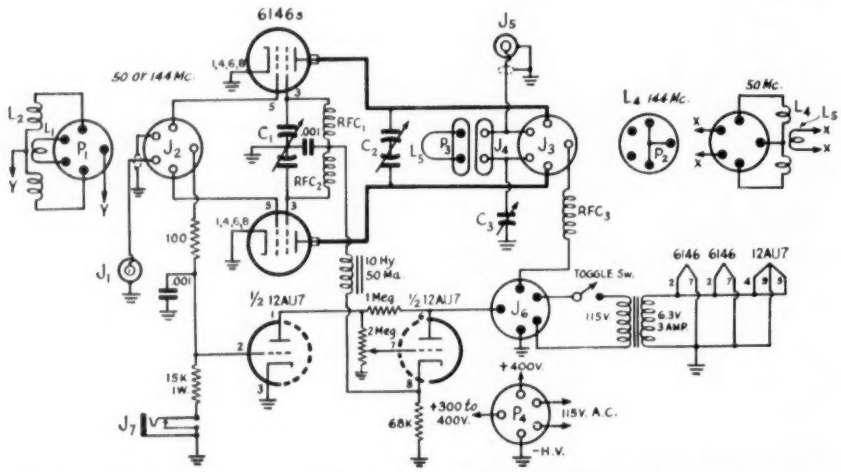


Fig. 3 — Schematic diagram and parts list for the two-band v.h.f. amplifier.

C_1 — 100-μμf.-per-section split-stator variable (Hammarlund HFD-100).

C_2 — 30-μμf.-per-section, double spaced (Hammarlund HFD-30X).

C_3 — 50-μμf. variable (Hammarlund HF-50).

L_1 — *50 Mc.:* 2-turn link around L_2. *144 Mc.:* Hairpin loop 1½ inches long, ½ inch wide. Made from 5½ inches No. 16 tinned. Cover with insulating sleeving. Solder into P_1.

L_2 — *50 Mc.:* 8 turns No. 14 tinned, 1½-inch diam., 2 inches long, center-tapped; 5-pin base (B & W 10JCL). *144 Mc.:* Same as L_1, but center-tapped and no insulation.

L_3 — Shown as heavy lines. Flashing copper strips ¼ inch wide, 3 inches long. Inner edges are 13/16 inch apart. Bend over ⅛ inch for soldering to plate caps. Connect C_2 2 inches from tube end.

L_4 — *50 Mc.:* 2 turns No. 14 each side, 1¾-inch diam., spaced ¼ inch. Leave ¾-inch space at center. (B & W 10JVL with one turn removed from each end.) *144 Mc.:* Short Pins 2, 3 and 4 of P_3.

L_5 — *50 Mc.:* 3-turn swinging link; part of L_4. *144 Mc.:* Hairpin loop made from 5½ inches No. 16 tinned. Cover 3½ inches with insulating sleeving. Loop is ¾ inch wide; portion parallel to plate line is ¾ inch long.

J_1, J_5 — Coaxial fitting (Amphenol 83-1R).

J_2, J_3 — 5-pin ceramic socket (Amphenol 49-RSS5).

J_4 — Crystal socket (Millen 33102).

J_6 — 5-pin male chassis connector (Amphenol 86-RCP).

J_7 — Closed circuit jack.

P_1 — 5-pin plug (Amphenol 86-CP5).

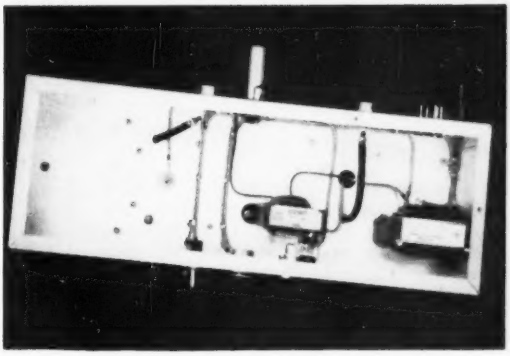
P_2 — 5-pin plug with cap (Amphenol 86-PM5).

P_3 — 300-ohm line plug (Millen 37412).

P_4 — 5-pin cable connector (Amphenol 78-PF5).

RFC_1, RFC_2 — Ohmite Z-50.

RFC_3 — Ohmite Z-144.



Bottom view of the v.h.f. amplifier. Power connector, coax fittings and clamp tube are mounted on the rear wall. Filament transformer is at the right and the screen-lead choke near the middle.

a part of the installation, even though the shielding it provides may not be required for TVI prevention. Tests have shown that the operation of the amplifier is much more stable and reliable when the cover is in place.

Testing and Use

With the clamp-tube system shown, there is no need to test the amplifier at any voltage less than that at which it is to be operated. The potentiometer control will allow the tubes to be run at less than the rated plate dissipation, so if the coils are resonated with a grid-dip meter it should be possible to run checks on the amplifier without preliminary tests at lower plate voltage.

First check the grid circuits to see if drive can be obtained on both bands. There should be at least 5 to 6 ma. grid current with either 2E26 rig running at 300 volts. There will undoubtedly be a surplus of drive on 50 Mc., so the grid circuit need not be exactly on frequency. The grid circuit on 144 Mc can be resonated by changing the shape of the grid loop, L_2, and the proximity to the coupling loop, L_1, can be adjusted for maximum grid current. Spreading the sides of the hairpin will lower the resonant frequency; bending them closer together raises it.

Now check neutralization, still without plate or screen voltage applied to the amplifier. Tune the plate circuit through resonance with grid drive applied, watching for a flicker in grid current. Adjust the screen neutralization capacitor until there is no dip in grid current as the plate condenser is tuned.

Next test the clamp-tube operation. Apply 300 to 400 volts to the clamp-tube plates and to the center tap of the plate circuit. Measure the 6146 plate current with no grid drive applied. With the potentiometer arm set at the ground end the plate current should be 125 ma. or less with no excitation. At 400 volts this is 50 watts input, or the maximum safe plate dissipation for a pair of 6146s. The tubes should not be operated for long periods in this way, but it is entirely safe for c.w. or normal testing operations.

Now connect a lamp or other dummy load across the output coaxial fitting. A 100-watt lamp makes a fair load, though you may want to use a smaller type to get a more sensitive output indication at first. Apply grid drive and then plate voltage and tune C_2 for maximum output. Set the antenna series condenser at the point that gives most output with lowest antenna coupling. Remove the grid drive and see if grid current drops to zero. If there is any sign of grid current, reset the screen neutralizing adjustment slightly until it disappears. The best neutralization will be achieved when maximum output, minimum plate current and maximum grid current all appear at the same setting of the plate tuning capacitor. If this condition cannot be achieved precisely, set the screen adjustment at the middle of the range over which no grid current remains after drive is cut off.

Once the amplifier is found to be working correctly it can be operated in several ways. No change is necessary in using either 'phone or c.w. with a 400-volt plate supply, but somewhat higher power can be run on c.w. if the screen is fed from a separate 300-volt source and a higher plate voltage is used. The maximum rating for the 6146s (up to 180 watts input) can be run on 50-Mc. c.w. if the screen voltage is held low enough so that the clamp circuit will hold the input to no more than 50 watts with the key up.

A 400-volt supply is probably the most convenient arrangement, especially if both types of emission and both bands are to be used. Normal operating conditions will then be as follows: plate current — 300 ma., max.; screen current — about 15 ma.; grid current — 3 to 6 ma.

The amplifier as shown is not only an effective final stage for the 100- to 125-watt level, but it is also well suited to serve as a driver for a kilowatt final stage, if you want to run the maximum legal power at a later date.

The transmitter may be used with balanced-line antenna systems by inserting either a balun or an antenna coupler between the coaxial output and an open-wire or Twin-Lead transmission line to the antenna system. Suitable designs for baluns made of coax can be found in all recent editions of the ARRL *Handbook*. Antenna couplers are also treated, and specific examples for v.h.f. use can be found in *QST* for January, 1952 (144 Mc.) and October, 1952 (50 Mc.).

Gadgets for the S-76

Some Useful Additions and Changes

BY LEWIS G. McCOY,* W1ICP

• If you have an S-76 receiver, don't pass up these simple modifications that will add to the receiver's performance. They cost only a few dollars and an evening's work.

In a recent review of the SX-88 receiver,[1] it was pointed out that this new receiver includes provision for reducing the low-frequency audio response to avoid the "boominess" associated with the high-selectivity reception of 'phone signals. It was mentioned parenthetically that a similar stunt had been tried in the Headquarters lab on an S-76 with equally good results. Upon reading the mention of this experiment, several S-76 owners wrote Headquarters asking for details. Since the volume of correspondence indicated that still others might be interested in the modifications of the S-76, the receiver was looked over to see if there were any other changes or possible additions that might add to the performance or operating convenience. This article is a result of that look.

One possibility was the addition of a small variable condenser across the input tuned circuit to serve as an antenna trimmer. Most operators these days like to have antenna trimmers on their receivers so one was installed on the S-76 for a trial. It proved to be a worth-while addition, particularly on the higher frequency bands.

Another change was the installation of a dial lock on the general-coverage tuning knob. In addition, a larger tuning knob was installed on the bandspread range. The dial lock insured the bandset staying "set," and the large knob on the bandspread range offered greater ease of tuning.

View of the receiver showing the installation of S_x above the send-receive switch. The dial lock and flat-rimmed dial modification are clearly visible along with the large bandspread tuning knob.

In the first production run of the S-76 the screen voltage to the mixer tube was unregulated. This was responsible for a change in the beat note of c.w. signals when the r.f. gain control was varied. In later models, the screen was connected to the regulated 150-volt line, eliminating this trouble. The mixer circuit should be checked to see if the screen voltage is regulated. If not, R_{11} should be connected to the 150-volt line.

When all the changes outlined above were completed, the receiver was given a good workout on Field Day. While it is sometimes difficult to improve an already good receiver, the modifications appeared to be well worth the time and effort needed to do the job.

Audio Modification

As can be seen in Fig. 1, the audio change is simply a matter of adding a condenser and switch. The 100-$\mu\mu$f. condenser, C_x, is wired in series with C_{80}. The switch, S_x, is connected across C_x to switch it into and out of the circuit.

S_x is mounted directly over the send-receive switch and the leads to C_x are run through the hole in the chassis that accommodates the S-meter leads. Shielded wire is used for the switch leads to avoid possible hum pick-up. Pin 1 of the audio tube can be used for a tie point for one end of C_x, C_{80} and a switch lead.

With C_x shorted out, the receiver performs the same as without the modification. When the receiver is used on 'phone with selectivity positions Numbers 3, 4 or 5, the voice becomes difficult to copy because of the boominess mentioned earlier. Switching C_x into the circuit restricts the bass response, reducing the bass and improving the intelligibility.

Another system that was tried and rejected was that of substituting for R_{57} a dual control and switch. The value of R_{57}, ½ megohm, remained the same and another ½-megohm variable resistor was connected across C_x. By adjusting both resistors, the amount of bass or treble could be gradually varied to suit the individual taste.

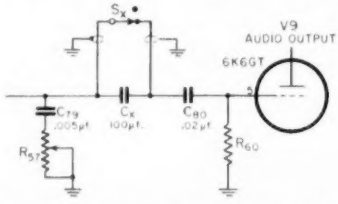
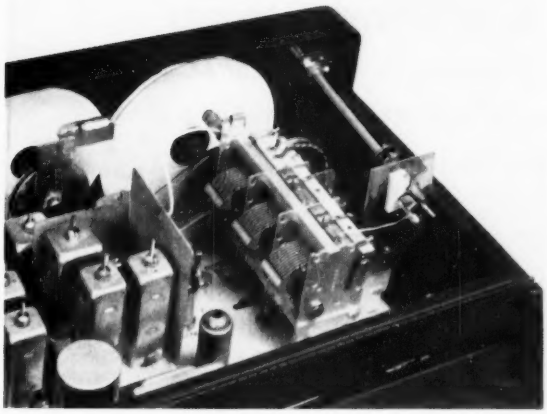


Fig. 1 — Circuit diagram of the audio change.

* Technical Assistant, *QST*.

[1] "The SX-88 Receiver," *QST*, June, 1954.



The antenna trimmer condenser is supported by a bracket mounted on the bandspread-condenser frame.

However, the apparent differences in audio quality were not enough to warrant the cost of the variable-resistor system.

Antenna Trimmer

As shown in the photograph, the mounting of the antenna trimmer condenser was a simple matter of making a bracket that fitted on the frame of the bandspread condenser. The bracket was a piece of aluminum, two by four inches. As the rotor of the trimmer condenser was grounded, a shaft-mounted type condenser was used. The condenser shown in the photograph is a Hammarlund HF-35. The stator of the trimmer was connected to the stator of the general-coverage condenser. A through-shaft bushing was installed on the panel at the front upper left-hand corner, to the left of the general coverage dial. A short piece of ¼-inch rod and two shaft couplers were used to connect the bushing shaft to the condenser rotor. The receiver was then tried on the various bands to see how the trimmer performed. It was found on some of the receiver ranges that the trimmer wouldn't peak. This was corrected by tuning the receiver to the center of an amateur band in the range, setting the condenser half-meshed, and then adjusting the r.f. and mixer trimmer condensers for maximum output. These condensers are located on the bottom of the receiver and the proper ones to adjust can be determined from the instruction book.

A comparison was made with another S-76 which didn't have the modification, and the receiver with the trimmer gave better performance on every frequency range.

Tuning Dial Changes

Several times while listening to the S-76, the bandset knob would get bumped or accidentally moved, causing the dial setting to go askew. This meant lost contacts or frantic tuning to try to reset the dial to the correct spot. This trouble was corrected by installing a Millen dial lock and Millen type 10007 flat-rimmed metal dial. The screw that holds the general coverage dial plate, the one adjacent to the general coverage tuning knob, was removed to accommodate the dial lock. For the lock to fit, the hole was slightly enlarged with a small file.

Last, but not least, the bandspread tuning knob was replaced by one with a much larger diameter. The operating improvement of such an installation is something that must be tried to be appreciated. In a receiver with the excellent selectivity of the S-76, the large tuning knob is a "must."

A.R.R.L. QSL BUREAU

W1, K1 — J. R. Baker, jr., W1JOJ, Box 232, Ipswich, Mass.
W2, K2 — H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
W3, K3 — Jesse Bieberman, W3KT, Box 34, Philadelphia 5, Penna.
W4, K4 — Thomas M. Moss, W4HYW, Box 644, Municipal Airport Branch, Atlanta, Ga.
W5, K5 — Oren B. Gambill, W5WI, 2514 N. Garrison, Tulsa 6, Okla.
W6, K6 — Horace R. Greer, W6TI, 414 Fairmount St., Oakland, Calif.
W7, K7 — Mary Ann Tatro, W7FWR, 513 N. Central, Olympia, Wash.
W8, K8 — Walter E. Musgrave, W8NGW, 1294 E. 188th St., Cleveland 10, Ohio.
W9, K9 — John F. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wis.
WØ, KØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.
VE2 — Austin A. W. Smith, VE2UW, 6164 Jeanne Mance, Montreal 8, Que.
VE3 — W. Bert Knowles, VE3QB, Lanark, Ont.
VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.
VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
VE6 — W. R. Savage, VE6EO, 329 15th St., North Lethbridge, Alta.
VE7 — H. R. Hough, VE7HR, 2316 Trent St., Victoria, B. C.
VE8 — W. L. Geary, VE8AW, Box 534, Whitehorse, Y. T.
VO — Ernest Ash, VO1A, P. O. Box 8, St. John's, Newfoundland.
KP4 — E. W. Mayer, KP4KD, Box 1061, San Juan, P. R.
KH6 — Andy H. Fuchikami, KH6BA, 2543 Namauu Dr., Honolulu, T. H.
KL7 — Box 73, Douglas, Alaska.
KZ5 — Gilbert C. Foster, KZ5GF, Box 407, Balboa, C. Z.

A Transient Demonstrator

Using a 'Scope for Illustrating the Behavior of LCR Circuits

BY GABRIEL P. RUMBLE,* W4DWZ

• This article describes a simple set-up for illustrating the behavior of circuits containing capacitance, inductance and resistance in various combinations. It is presented here with the thought that many ham clubs, particularly those connected with schools, will find the demonstration both interesting and profitable.

At an early stage in his training, the student of electricity should become thoroughly familiar with the characteristics of three basic circuit elements: resistance, capacitance, and inductance. If he is to make satisfactory progress, the beginner must learn to understand not only the intrinsic natures of L, C, and R, but also the nature of their *interaction;* in other words, how L reacts with C, C with R, and R with L. It will be found this interaction accounts for the periodicity of L-C circuits and the rate of charge and decay of R-C and R-L circuits.

Probably most beginners, and many others as well, would welcome any aid which will help in grasping the meaning of such expressions as $f = 1 \div 2\pi\sqrt{LC}$, *Time Constant* $= RC$, and *Time Constant* $= L/R$. Taken alone, these necessary formulas may seem dull and academic, but if they can be demonstrated in action, and made to come alive on an oscilloscope screen, they will take on new interest and significance. Without understanding the significance of these formulas, the amateur will have, at best, only a hazy conception of condenser differentiation (so important in pulse circuits) and the all-important phenomenon of resonance.

Fig. 1 is the schematic of a small demonstration board which, when used with a 'scope, provides a dynamic display of the reactions of L, C, and R. The board can be constructed in a couple of hours with the parts available around the average ham shack or radio laboratory. The values given in the schematic of Fig. 1 were simply the first reasonable sizes that came to hand, and are not the result of careful calculations. A little experimentation should enable one to better, or at least equal, the results obtained with the values of L, C, and R shown.

In order to display transient phenomena satisfactorily on a 'scope, the action should be repetitive. For purposes of this experiment, a polar relay (WE type 215, familiar to anyone working with radioteletype) is used, with the two solenoids connected in series with a 115-volt 60-cycle source, and a limiting resistor of about 8000 ohms. This lash-up assures a make and break sixty times each second, convenient for synchronization with a 60-cycle sweep. By adjustment of the contacts and pole pieces of the relay, it is easy to obtain a favorable ratio between the durations of make and break time.

With switches S_2 and S_3 closed and, with proper adjustment of the oscilloscope, the familiar R-C decay curve of Fig. 2A will be obtained. The make of the contact will occur at B, with BC representing the magnitude of the battery voltage (22½ volts). D represents the moment of the break of the relay contact and DE the desired curve. Portion AB, if any, is the continuation or tail end of DE. In RC seconds (R in ohms, and C in farads) after the relay opens, and the capacitor starts discharging through the resistor, the voltage across the capacitor will have fallen to $100/\epsilon$ per cent (36.8 per cent) of its initial value ($\epsilon = 2.72$).

With switches S_1 and S_3 closed, and with R adjusted, the perhaps-not-quite-so-familiar R-L decay curve of Fig. 2B is obtained, with the curved slope inverted from that obtained with R and C. Why is there an instantaneous voltage inversion

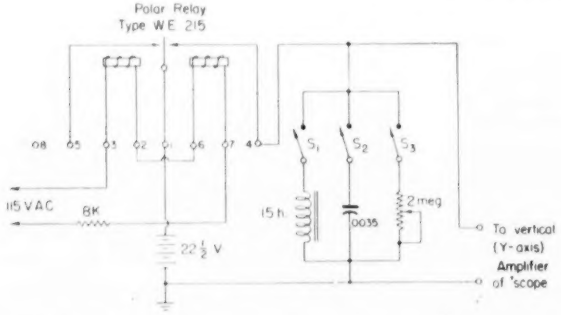


Fig. 1 — Circuit of the transient demonstrator.

* 134 Forest Ave., Macon, Georgia.

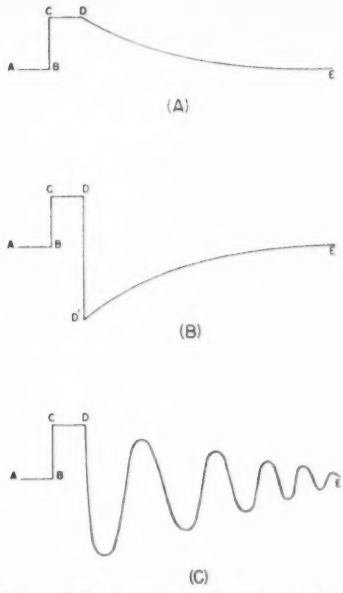


Fig. 2 — Typical transient patterns; (A) for C and R, (B) for L and R, (C) for L and C.

DD' at the moment of the relay contact break at D? Because, owing to the collapse of the field of L, there is a sudden reversal in the direction of current through R at the instant of break of the relay contact, D, in Fig. 2B. Here *Time Constant* (seconds) equals L/R, with R in ohms and L in henrys. At the end of TC seconds, the voltage will have reached 63.2 per cent (that is, $100-100/e$ per cent) of the battery voltage originally existing across the parallel R-L combination.

With switches S_1 and S_2 closed, and S_3 open, the logarithmically-damped wave-train of Fig. 2C is obtained on the 'scope. The frequency of oscillation equals $1 \div 2\pi\sqrt{LC}$ which, substituting the values of L and C given in Fig. 1, equals $1 \div 6.28\sqrt{15(35)\,10^{-10}}$, or approximately 695 c.p.s. With a sweep duration of 1/60 second, 695/60, or approximately 11.5 cycles, should be displayed. Close agreement should be found between this computation and the number of cycles counted on the 'scope screen.

In adjusting the relay, make certain that the contacts are so set that the armature rests in the neutral or open position when the equipment is not in use; otherwise the battery will run down by discharging through L or R if either of these switches is inadvertently left closed.

Experience has shown that this oscilloscope demonstration of the interaction of L, C, and R, together with a careful blackboard explanation, helps to furnish an insight into the character of electric circuit elements and thus paves the way toward an understanding of complex circuit behavior, such as may be encountered in actual practice.

Strays

Fifty-five hams and 20 XYLs attended the second annual Single-Sideband Steak Dinner held at Chicago in early August. Taking time out from filter-vs.-phasing discussions we find (*first row, l. to r.*): W8EMO, W9IBD, W9LKK, W9NIK, W9DYV, W4EGK, W4VKL, W9WOL, W9SZH, W9AHK, W9LSK, W9QHH, WØGSH. *Second row:* W8HIK, WØEYU, W9GEX, W9UIT, W9BUT, W8FTN, W9LBH, W4SXN, W9KOY, W9MOW, W9PPQ, W9CAJ, W9JC, W9TFV. *Third row:* W9BRT, W8LSN, W9HKS, W8PBR, W8LEX, W8JNF, W8MXO, W9YVG, W9IHO, W9CCT, W8IBP, W9AFO. *Last row:* W9HFK, W9DKU, W9LUO, W9CTN, W9EWC, W9BVW, W9MO, W9JO and W9AC. You'll find many of these folks active on the S.S.B. Interstate Net which meets Mondays and Fridays at 8 P.M. EST on 3980 kc. with W9KOY as net manager.

Announcing the 21st ARRL Sweepstakes

Certificates to C.W. and 'Phone Winners in Each Section and to Top Club Scorers; Special Novice Awards

CONTEST PERIODS

Time	*Start* Nov. 13th & 20th	*End* Nov. 15th & 22nd
EST	6:00 P.M.	3:01 A.M.
CST	5:00 P.M.	2:01 A.M.
MST	4:00 P.M.	1:01 A.M.
PST	3:00 P.M.	12:01 A.M.

Now is the time to get your station set for the 21st Annual ARRL Sweepstakes. This popular activity affords you an opportunity to pit your skill against the best operator in your ARRL section, and to fill in any states you may need for WAS. Every amateur in every League section is urged to participate; whether or not you're an ARRL member, you are invited to get into the SS and submit an entry. All scores reported in accordance with the rules will be listed in a *QST* tabulation of final results.

The rules are exactly the same as those of last year. The contest will run over two consecutive week ends, with a maximum allowable total operating time of 40 hours out of the possible 66 for each entry ('phone or c.w.). You may operate both 'phone and c.w., but please file separate logs for each mode.

Entries by multiple-operator stations are encouraged and will be listed, but only single-operator stations will be eligible for the certificates offered to the top 'phone scorer and the top c.w. scorer in each section. Multiple-operator scores can be grouped with single-operator scores in club competition, however, and a handsome gavel is offered to the club with the highest aggregate score. Within a club, single-operator entries can compete for the "club certificate" awards given to the top c.w. and 'phone scorers. A special c.w. certificate will also go to the highest scoring Novice or Technician in each section where at least three such licensees submit c.w. logs; similarly, a 'phone certificate will be awarded where applicable.

It doesn't take the newcomer long to catch on to SS procedure. Simply call "CQ SS" or answer such a call, exchange preambles in the form shown elsewhere in this announcement, and keep your log properly. ARRL will gladly send you contest forms upon request, or you can draft your entry in accordance with the sample.

The Sweepstakes puts a premium on operating skill rather than on power, since the score multiplier (1.25 on c.w., 1.5 on 'phone) for stations running 100 watts input or less insures that there will be much low-power operation.

For the purposes of this contest VE8s in N.W.T. may be considered attached to Yukon section; likewise Newfoundland (VO) and Labrador (VO6) count as Maritime.

Whether you prefer 'phone or c.w. work, there will be plenty of stations eager to exchange SS information with you. So read over the rules to acquaint yourself with the details, and then stand by for two week ends of real operating enjoyment.

Rules

1) *Eligibility:* The contest is open to all radio amateurs in (or officially attached to) sections listed on page 6 of this issue of *QST*.

2) *Time:* All contacts must be made during the contest periods indicated elsewhere in this announcement. Time may be divided between week ends as desired, but a total of 40 hours must not be exceeded for each entry. Time spent in listening counts as operating time.

3) *QSOs:* Contacts must include certain information sent in the form of a standard message preamble, as shown in the example. C.w. stations work only c.w. stations and 'phone stations only other 'phones. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your preamble and/or receipt of a preamble.

4) *Scoring:* Each preamble sent and acknowledged counts one point. Each preamble received counts one point. Only two points can be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (see p. 6) worked during the contest is the "sections multiplier." It is not necessary for preambles to be sent both ways before a contact may count, but one must be received, or sent and acknowledged, before credit is claimed for either point(s) or multiplier. Apply a "power multiplier" of 1.25 to c.w. entries and 1.5 to 'phone entries if the input power to the transmitter output stage is 100 watts or less at all times during contest operation.

The final score equals the total "points" multiplied by the "sections multiplier" multiplied by the "power multiplier."

5) *Reporting:* Contest work must be reported as shown in the same form. Lithographed contest forms will be sent gratis upon receipt of radiogram or postcard request. Indicate starting and ending times for each period on the air. All Sweepstakes reports become the property of ARRL. No contest reports can be returned.

There are no objections to one's obtaining assistance from logging, "spotting" or relief operators, but their use places the entrant in the multiple-operator class, and it must be so reported.

A single-operator station is one manned by an individual amateur who receives no assistance from other persons during the contest periods. He may not have assistance in any manner in keeping the station log and records, or in

HOW TO SCORE

Each preamble sent and acknowledged counts one point.

Each preamble received counts one point.

Only two points can be earned by contacting any one station, regardless of the frequency band used.

For final score: Multiply totaled points by the number of *different* ARRL sections worked; that is, the number in which at least one bona fide SS point has been made. Multiply c.w. scores by 1.25 and 'phone scores by 1.5 if you used 100-watts-or-less transmitter input *at all times* during the contest.

EXPLANATION OF "SS" CONTEST EXCHANGES

Send Like a Standard Msg. Preamble, the	*NR*	*Call*	*CK*	*Place*	*Time*	*Date*
Exchanges	Contest info. numbers, 1, 2, 3, etc., for each station worked	Send your own call	CK (RST report of station worked)	Your ARRL section	Send time of transmitting this NR	Send date of QSO
Sample	NR 1	W1AW	589	CONN	1812	NOV 13

spotting stations during a contest period. The operation of two or more transmitters simultaneously at single-operator stations is not allowed. Contest reports must be postmarked no later than December 8, 1954, to insure eligibility for *QST* listing and awards.

6) *Awards:* Certificates will be awarded to the highest c.w. scorer and to the highest 'phone scorer in each ARRL section. A c.w. certificate will also be awarded to the highest scoring Novice or Technician in each section where at least three such licensees submit c.w. logs; similarly, a 'phone certificate will be earned by a Novice or Technician in each section where a total of three such licensees submit 'phone logs. Only single-operator stations are eligible for certificate awards. Multiple-operator scores will receive separate *QST* listing in the final results.

A gavel will be awarded to the highest club entry. The aggregate scores of 'phone and c.w. reported by club secretaries and confirmed by the receipt at ARRL of contest logs constitute a club entry. Segregate club entries into 'phone and c.w. totals. Both single- and multiple-operator scores may be counted for club entries. Only the scores of bona fide club members, in a local club territory, may be included in club entries.

The highest single-operator c.w. score and the highest single-operator 'phone score in any club entry will be rewarded with a "club" certificate where at least three single-operator 'phone and/or three single-operator c.w. scores are submitted.

7) *Disqualification:* Failure to comply with the contest rules or FCC regulations or the necessity for avoiding interference with channels handling amateur emergency communication shall constitute grounds for disqualification. In all cases of question, the decisions of the ARRL Contest Committee are final.

Sample of report form that must be used by contestants

STATION W. . . . —SUMMARY OF EXCHANGES, TWENTY-FIRST A.R.R.L. ALL-SECTION SWEEPSTAKES

Freq. Band (Mc.)	*Time On or Off Air*	*Sent (1 point)* NR	Stn.	CK-RST	Section	Time	Date (Nov.)	*Received (1 point)* NR	Stn.	CK-RST	Section	Time	Date (Nov.)	*Number of Each Different New Section as Worked*	*Points*
3.5	On 1810	1	W1AW	589	Conn.	1812	13	7	W8PBU	589	Ohio	1814	14	1	2
"	"	2	"	589	"	1815	"	6	W1BFT	599	N. H.	1817	"	2	2
"	"	3	"	579	"	1820	"	6	W1BIH	579	Conn.	1821	"	3	2
7	"							24	W5MSH	479	Ark.	2005	"	4	1
"	"	4	"	479	"	2115	"	38	W5DWB	579	N. Mex.	1915	"	5	2
"	"	5	"	579	"	2128	"	45	W6BIP	479	S. F.	1820	"	6	2
"	"	6	"	589	"	2133	"	59	WN8OXI	589	Ohio	2134	"	...	2
"	Off 2135 Time: 3 hrs. 25 min.														
	On 1845														
14	"	7	"	569	"	1915	14	94	KL7EVR	569	Alaska	1418	15	7	2
"	"	8	"	569	"	1925	"	127	W7HAH	569	Idaho	1728	"	8	2
"	"	9	"	469	"	1935	"	114	W7PKX	569	Wyo.	1730	"	9	2
3.5	"	10	"	579	"	2110	"	130	WØEOZ	579	N. D.	2005	"	10	2
"	"	11	"	589	"	2112	"		W5MSH		Ark.				1
"	Off 2115 Time: 2 hrs. 30 min.														

Total Operating Time: 5 hrs. 55 min. 3.5, 7 and 14 Mc. used. 10 Sec., 22 Pts.
85 Watts Input Power

Assisting person(s): name(s) or call(s): .....

Claimed score: 22 points × 10 sections = 220 × 1.25 (85 watts input) = 275

I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge.

Signature .....

Address .....

Tube line-up .....

Number different stations worked .....

Happenings of the Month

DIRECTOR ELECTIONS

In four of the eight ARRL divisions currently holding elections, incumbent directors have been returned to office, remaining on the job for another two-year term beginning January 1st. They are Hudson Division Director **George V. Cooke, jr., W2OBU;** Northwestern Division Director **R. Rex Roberts, W7CPY;** and Rocky Mountain Division Director **Claude M. Maer, jr., WØIC;** all nominated without opposition. In addition, Roanoke Division Director **P. Lanier Anderson, jr., W4MWH,** was declared reëlected when Charles D. Chandler, W4BO, was found ineligible because of insufficient continuity of membership.

Two vice-directors were unopposed and are similarly returned to office for a two-year term. They are **Thomas J. Ryan, jr., W2NKD,** Hudson Division; and **Karl W. Weingarten, W7BG,** Northwestern Division. **Walter M. Reed, WØWRO,** was unopposed and was declared the new vice-director of the Rocky Mountain Division. Employed by the Continental Oil Co., of Denver, Colo., Mr. Reed is past secretary of the Mile High Radio Club, past vice-president and secretary of the Denver Radio Club, and at present is the treasurer and a director of the Denver Radio Club. He has also functioned as EC for Arapahoe County. **George E. Keith, W9QLZ,** was declared elected as vice-director of the Central Division when John G. Doyle, W9GPI, and Wesley E. Marrmer, W9AND, withdrew their names as candidates. Mr. Keith, assistant to the Plant Chemist of Westclox Division, General Time Corporation, La Salle, Illinois, has been a director assistant, and is presently the secretary-treasurer of the Starved Rock Radio Club. Licensed in 1937, he has also served as chairman of several hamfest committees for the Starved Rock Radio Club.

SPECIAL ROANOKE ELECTION

To All Full Members of the ARRL Residing in the Roanoke Division:

A special election is about to be held to choose a vice-director for the 1955–1956 term, inasmuch as there was no valid nomination for this office filed in the course of the regular election now being completed.

Nomination is by petition, which must reach the Headquarters by noon of December 20, 1954. Ten or more Full Members of the Roanoke Division may join in nominating any eligible Full Member of that Division. The election procedures are specified in the By-Laws, a copy of which will be mailed to any member upon request. Or refer to the August and September *QST* election notices for general information. Full Members are urged to take the initiative and file nomination petitions immediately.

For the Executive Committee:

A. L. BUDLONG
Secretary

October 1, 1954

K4 CALLS BEING ISSUED

Amateurs in the 2nd and 6th call areas have long been familiar with the fact their numbers have grown so great that it has become necessary to start "K" prefixes — the alphabet having been exhausted for "W's". Now the same thing has come about in a call area we would be willing to bet would be one of the last you'd think of as candidate for the next on the list: the 4th! Reason we mention this is that FCC tells us quite a few hams getting K4 calls figure it must be a typographical error and fire their tickets back, with resulting additional explanations and correspondence. So if you get a K4 call — you've got it; that's it!

MAIL LICENSE PROCEDURES

Outside of a few quirks FCC's licensing section has become accustomed to, such as an applicant indicating the year of his birth as 1954, the new mail examination procedures seem to be working out reasonably smoothly. FCC does ask that we remind mail applicants that their completed application and examination papers *go back to the district office from which secured,* and not direct to Washington. The only amateur applications which go to Washington direct are those not dealing with any change of privileges; in other words, modifications for change of address or renewal applications. Papers where an exam is involved go back to the district office. Also some aspirants for new tickets are writing Washington for exam papers, such requests, again, should be directed to the district office.

RECENT COMMISSION ACTIONS

In October there appeared in this department notice of two recent FCC actions. One concerned a proposal to give Technicians the use of 50–54 Mc. and 144–148 Mc. Final comment is November 15th. The other was a report and order in Docket 10927 relative to expanded suballocations in the 14- and 28-Mc. 'phone bands, and the amendment to permit A0 emission in the 51–54 Mc. portion of the 50–54 Mc. band. The text of both actions follows:

Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington 25, D. C.

FCC 54-1110
9281

In the Matter of Petitions for amendment of Part 12, Rules Governing Amateur Radio Service, concerning Technician Class operator privileges.	DOCKET NO. 11157

NOTICE OF PROPOSED RULE MAKING

1. Notice is hereby given of proposed rule making in the above-entitled matter.

2. The Commission has before it for consideration petitions for rule making filed by James M. Price and Tom A. Walker.

3. The petitions request amendment of Part 12, Rules Governing Amateur Radio Service, to permit operating privileges for the Technician Class amateur operator in the 50–54 Mc. amateur frequency band. One petitioner states that: "The..... petition is made in the interest of increased utilization of existing amateur assignments and the improvement of techniques in the VHF spectrum by amateur operators.....The effect ..... would be to make available to those amateurs holding Technician Class licenses one band of frequencies on which there exists the frequent possibility of two-way communication by sporadic E layer propagation. This fact alone, it is anticipated, will encourage immediate and representative participation by those licensees .....The beneficial by-product of such action would be the tapping of the skills possessed by such licensees for the improvement of present amateur VHF techniques."

4. Believing that greater amateur occupancy of, and experimentation in, the amateur frequency bands above 50 Mc. is desirable, the Commission is proposing amendment of the Rules to provide for operating privileges for Technician Class amateur operators in the 144–148 Mc. amateur frequency band as well as the 50–54 Mc. band. In addition to the reasons given by the petitioners, the Commission believes that the technician's value to, and participation in, civil defense communications through the Radio Amateur Civil Emergency Service would be considerably enhanced by the amendment proposed herein.

5. Authority for issuance of the amendment contained in the attached Appendix is vested in the Commission by virtue of Sections 4(i) and 303(f), (g), and (r) of the Communications Act of 1934, as amended.

6. Any interested person who is of the opinion that the proposed amendment should not be adopted, or should not be adopted in the form set forth herein, may file with the Commission on or before November 15, 1954 written data, views, or arguments setting forth his comments. Comments in support of the proposed amendment may also be filed on or before the same date. Comments in reply to the original comments may be filed within 15 days from the last day for filing said original data, views, or arguments. No additional comments may be filed unless (1) specifically requested by the Commission, or (2) good cause for the filing of such additional comments is established. The Commission will consider all such comments prior to taking final action in this matter, and if comments are submitted warranting oral argument, notice of the time and place of such oral argument will be given.

7. In accordance with the provisions of Section 1.764 of the Commission's Rules, an original and four copies of all statements, briefs, or comments shall be furnished the Commission.

FEDERAL COMMUNICATIONS COMMISSION

MARY JANE MORRIS
Secretary

Attachment:
Appendix
Adopted: September 1, 1954
Released: September 7, 1954

APPENDIX

AMENDMENT OF SECTION 12.23(d) OF PART 12, RULES GOVERNING AMATEUR RADIO SERVICE, IS PROPOSED AS FOLLOWS:

(d) *Technician Class.* All authorized amateur privileges

(*Continued on page 52*)

WHAT BANDS AVAILABLE?

Below is a summary of the U. S. amateur bands on which operation is permitted *as of October 15th.* Readers are cautioned that a number of proposals are now pending before the FCC and that action on those proposals may later change this compilation to some extent. Changes will, as usual, be announced by W1AW bulletins. Figures are megacycles. AØ means an unmodulated carrier; A1 means c.w. telegraphy; A2 is m.c.w.; A3 is a.m. 'phone; A4 is facsimile; A5 is television; F1 is Frequency-shift keying; n.f.m. designates narrow-band frequency- or phase-modulated radiotelephony; and f.m. means frequency modulation, 'phone (including n.f.m.) or telegraphy.

3.500–4.000 — A1
3.500–3.800 — F1
3.800–4.000 — A3 and n.f.m.
7.000–7.300 — A1
7.000–7.200 — F1
7.200–7.300 — A3 and n.f.m.
14.000–14.350 — A1
14.000–14.200 — F1
14.200–14.300 — A3 and n.f.m.
14.300–14.350 — F1
21.000–21.450 — A1
21.000–21.250 — F1
21.250–21.450 — A3 and n.f.m.
26.960–27.230 — AØ, A1, A2, A3, A4, f.m.
28.000–29.700 — A1
28.500–29.700 — A3 and n.f.m.
29.000–29.700 — f.m.
50–54 — A1, A2, A3, A4, n.f.m.
51–54 — AØ
52.5–54 — f.m.
144–148, 220–225 — AØ, A1, A2, A3, A4, f.m.
420–450[1], 1,215–1,300 — AØ, A1, A2, A3, A4, A5, f.m.
2,300–2,450, 3,300–3,500, 5,650–5,925, 10,000–10,500, 21,000–22,000, All above 30,000 — AØ, A1, A2, A3, A4, A5, f.m., pulse

[1] Peak antenna power must not exceed 50 watts.

In addition, A1 and A3 on portions of 1.800–2.000, as follows:

Area	*Band, kc.*	*Power (watts) Day*	*Night*
Minn., Iowa, Mo., Ark., La. and east, including Puerto Rico and Virgin Is's.	1800–1825 1875–1900	500	200
N. and S. Dak., Neb., Colo., N. Mex., and west, including Hawaiian Ids.,	1900–1925 1975–2000	500*	200*
Texas, Okla., Kansas	1800–1825 1875–1900	200	75

* Except in State of Washington where daytime power limited to 200 watts and nighttime power to 50 watts.

Novice licensees may use the following frequencies, transmitters to be crystal-controlled and have a maximum power input of 75 watts.

3.700–3.750	A1	21.100–21.250	A1
7.175–7.200	A1	145–147	A1, A3

Technician licensees are permitted all amateur privileges in the bands 220 Mc. and above.

in the amateur frequency bands above 50 Megacycles.

—···—

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D. C.

FCC 54-1109
9278

In the Matter of Petitions of the American Radio Relay League for amendment of Part 12, Rules Governing Amateur Radio Service.	DOCKET NO. 10927

REPORT AND ORDER

By the Commission: Commissioners Hyde, Chairman; Sterling and Hennock not participating.

1. As a result of its consideration of petitions for rule making filed by the American Radio Relay League, the Commission adopted the Notice of Proposed Rule Making in this proceeding, and it was duly published in the Federal Register on February 27, 1954 (19 FR 1121). The Notice contained proposed amendments to Sections 12.111(d) and (g) to expand the amateur frequency sub-bands 14.20–14.30 and 28.50–29.70 Mc. presently available for telephonic emissions to 14.20–14.35 and 28.25–29.70 Mc., respectively. The Notice also contained proposed amendments to Sections 12.111(h) and 12.134 to permit the use of type A0 emission in the 51.0–54.0 Mc. portion of the 50.0–54.0 Mc. amateur frequency band. The petitioner's request for a mobile-only telephony sub-band in the 3775–3800 Kc. portion of the 3500–4000 Kc. amateur frequency band was not proposed, but comment "as to the propriety of subdividing not only this but also other amateur bands and of subdividing the amateur bands for other purposes as well as mobile radio-telephone" was invited. The petitioner's request for provision, on a temporary or trial basis, of additional frequency space in the 50 Mc. band for use by Novice Class operators was not proposed on the basis that the Commission believed it unwise to permit such operation because the novice, in general, cannot be expected to have the experience and technique to successfully cope with the serious problems of interference to television reception likely to result from operations in the band.

2. Following publication of the Notice, a number of written comments were received from individual amateurs and amateur organizations. In general, the comments supported provision for A0 emission in the 50 Mc. band, opposed establishment of a mobile-only sub-band for telephony at 3775–3800 Kc., and opposed the subdivision of the amateur bands for other purposes as well as for mobile radiotelephone. The American Radio Relay League requested "the withdrawal of its petition . . . seeking to establish a mobile voice suballocation in 3775 to 3800 kilocycles" and expressed "itself as in agreement with the general philosophy of the Commission . . . that the setting aside of portions of the amateur frequency bands for the use of special groups would not permit the fullest and most diversified use of all frequencies available for amateur radio operation."

3. The League, in its comment, continued to support its original position that expansion of the 14 and 28 Mc. bands for telephony is desirable for the relief of the crowded occupancy thereof. A number of amateurs, including many who prefer telephony, expressed opposition to such expansion. Comment favorable to the retention of the present subdivisions for telephony was on the basis that the primary use of the two frequency bands in question is for international contacts and that the proposed expansion would decrease their usefulness for this purpose for both foreign and domestic amateurs regardless of whether telegraphy or telephony would be used.

4. Additionally, it was pointed out that present occupancy of the 28 Mc. band is very light and that when propagation conditions again reach the state where heavy occupancy will be encouraged therein, widespread use of the 21 Mc. band may be expected for the first time since it was allocated to the amateur service, thus offering some relief of congestion in both the 14 and 28 Mc. bands.

5. In view of the fact that the effect of the availability of the 21 Mc. amateur frequency band upon congestion in the 14 and 28 Mc. bands cannot be assessed until some time in the future when propagation conditions are such as to encourage increased activity in the 21 and 28 Mc. bands, the Commission believes it to be in the best interest of the Amateur Service to defer further consideration of expansion of the 14 and 28 Mc. sub-bands for telephony. Therefore, the Commission is hereby dismissing the proposed amendment of Sections 12.111(d) and 12.111(g).

6. Comments received concerning the petitioner's request for novice operation in the 50 Mc. band did not disclose any facts not already considered by the Commission in making its initial decision that it would be unwise to propose such rule changes at this time. The Commission will, however, consider other means of encouraging amateur use of the 50 Mc. frequency band.

7. The Commission believes that encouragement and improvement of the Amateur Radio Service will result from the adoption of the amendments providing for the use of A0 emission in the 50 Mc. amateur frequency band. These amendments are issued pursuant to authority contained in Sections 4(i) and 303(f) and (r) of the Communications Act of 1934, as amended. Therefore, it is ORDERED that, effective 3:00 A.M., EST, October 15, 1954, Sections 12.111(h) and 12.134 of Part 12, Rules Governing Amateur Radio Service, ARE AMENDED as set forth in the attached Appendix.

FEDERAL COMMUNICATIONS COMMISSION
MARY JANE MORRIS
Secretary

Attachment: Appendix
Adopted: September 1, 1954
Released: September 7, 1954
(NOTE: Rules changes herein will be included in Amendment 12–5.)

APPENDIX

PART 12, RULES GOVERNING AMATEUR RADIO SERVICE, IS AMENDED IN THE FOLLOWING PARTICULARS:

1. Amend Section 12.111(h) to read as follows:
   (h) 50.0 to 54.0 Mc. using types A1, A2, A3, and A4 emissions and narrow band frequency or phase modulation for radiotelephony, 51.0 to 54.0 Mc. using type A0 emission, and on frequencies 52.5 to 54.0 Mc. special emission for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques.)
2. Amend Section 12.134 to read as follows:
   §12.134 *Modulation of carrier wave.* Except for brief tests or adjustments and except for operation in the band 26.96 to 27.23 Mc., an amateur radiotelephone station shall not emit a carrier wave on frequencies below 51 Mc. unless modulated for the purpose of communication.

MEMBERSHIP CHANGES OF ADDRESS

Four weeks' notice is required to effect change of address. When notifying, please give old as well as new address. Advise promptly so that you will receive every issue of *QST* without interruption.

Correspondence From Members-

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

EMERGENCY TRAFFIC

USS *Lloyd Thomas* (DDE-764)
% Fleet Post Office
New York, N. Y.

Editor, *QST*:

Shortly after the hurricane of August 31st which swept Long Island and New England, I listened to the Rhode Island Emergency Net try to establish emergency communications within the state on 75-meter 'phone. There was so much QRM, especially from s.s.b. stations, that a station in Newport (one of the stricken areas) could not be heard in Providence, thirty miles away. I cannot imagine anyone deliberately interfering with emergency traffic, so I assume the s.s.b. stations were not listening for a.m. signals, and did not hear the repeated pleas of the NCS to clear the frequency. I feel it is the obligation of every ham to cooperate and assist in an emergency, even though it means the installation of additional equipment in s.s.b. stations so they can monitor their frequencies for c.w. and a.m. signals. But whatever the solution, let's not have any more of this "blind" transmission of s.s.b. or any type emission on a frequency being used for emergency traffic.

— *Charles Greene, W2FFH*

TECH TALK

38 Cromwell St.
Kittery, Maine

Editor, *QST*:

It was with great interest that I read the article "Technician Speaks" in the Sept. issue of *QST*. I am also a Technician Class "tinkerer" and have had it "mentioned" to me also. First of all, the ones who appear most disgusted with the Technician are usually the ones who built transmitters back in the spark-gap days and have neither rebuilt their rigs or built working pieces of new gear since. The person who is most tolerant is the one who builds new gear as the plans appear. This type of ham is a tinkerer also, as I have yet to meet one who got a piece of gear working the first time to his complete satisfaction. In summary: 1) you disgusted ones, mind your own business—2) from this QTH, three cheers for each and every Technician—3) again to the disgusted ones, when 220 Mc.-and-up techniques are perfected, stay down on your own beloved QRM-filled bands. When I get my General Class I shall do more work with 220 Mc. and up, anyhow.

— *Robert G. Dawson, sr., W1YDX*

311-B Tennessee
Forrestal Village
North Chicago, Ill.

Editor, *QST*:

I am in wholehearted agreement with W4EUK (Correspondence, Sept.). We differ only in that I prefer to "tinker" on lower-frequency equipment; I prefer to operate only for purposes of testing, and I don't enjoy that.

It is becoming increasingly apparent, as can be noticed by listening to both 'phone and c.w., that the majority of hams are incapable of designing and building their own. "Receiver here is a ..... super-blooper and transmitter is a ..... I kw. with type ..... modulator (or keyer) into an ..... antenna." Fill in the blanks with appropriate manufacturer's names and/or model numbers. They are seemingly capable of plugging in the power cords, and may (doubtful) be able to tune their own gear.

If I weren't able to *design* and build my equipment, rather than just build a rig using someone else's design, I'd never have applied for a ticket . . . code or no code. . . .

— *G. H. Rosengren, W8CTF*

BREAK-FEST

285 So. Mesquite St.
New Braunfels, Texas

Editor, *QST*:

I read with interest the comments of the gentleman regarding use of phonetics a few issues back. His call slips my mind and I don't have the *QST* at hand, but I want to agree with him wholeheartedly. I'll never understand why two stations that are reading each other R5 have to spell out every word phonetically. I'll lay some odds that I can handle three times as much traffic as most of them in about half the time, on single sideband. He forgot to mention another thing that is just about as silly. I refer to the characters that pop in on a QSO yelling, "Break, break, break." If those characters could hear a tape recording of themselves just once I think they might stop it.

— *Floyd J. Barton, W5JBZ*

NO EXAGGERATION

Route 1, Box 1236
Elk Grove, Calif.

Editor, *QST*:

I have been a radio amateur for over 15 years and I find that ham radio is a great hobby. There have been steady advances in radio, but unfortunately this same improvement is not apparent in some of the hams' conduct on the air. The letters from the nonhams in the August *QST* describe the present problem very well, with no exaggeration. It is more serious than many may think.

This is certainly a shame that such a few fellows on the air can spoil things for the rest. . . .

Furthermore, there seem to be inane disputes now and then on who has the right to a certain frequency. A real ham is a gentleman and has tolerance and understanding. Our carriers are of intermittent nature; then there are skip and varying receiving conditions under varying noise levels to consider. All these variable factors sometimes make it difficult to judge who was operating first on a certain frequency. Most boys are real sports about this matter, but there is that small minority who are downright nasty and jump to the conclusion that the other man was careless or just didn't care. Let's be quicker to commend and much slower to condemn our brother ham.

There are also some gripes about nets. I would judge a majority of the nets are serving some good and useful purpose; others are mostly for rag chew. I, myself, belong only to the emergency nets, but I believe that even a rag-chew net is indirectly serving a good purpose for the rest of the boys. A net is confined to one frequency instead of many frequencies; consequently, there is more space and less QRM on the other portions of the band.

— *Paul N. Franusich, W6RSZ*

HAMFEST CALENDAR

WISCONSIN — The Mancorad Radio Club, Inc., 3rd annual "Fall Hamfest" will be held on Saturday, November 6th, at the Lincoln Park Fieldhouse, Lincoln Boulevard, two blocks north of Waldo. Single-sideband discussion and practical demonstration by Mr. Cal Heisinger, W9TRG, Chief Engineer, Lakeshore Industries. Hours 4 P.M. to 11 P.M. with buffet-style dinner at 6 P.M. Advance registration $1.50 and, please note, limited to 150, the capacity of the dining room, or $1.75 at the door if not already sold out. Make your reservation immediately by check or money order payable to the club in care of P. O. Box No. 401, Manitowoc, Wisconsin.

Hints and Kinks For the Experimenter

HOMEMADE GUY-WIRE INSULATORS

WHEN the A-frame mast to support a new 7-Mc. antenna was about to be raised, it was discovered that the supply of strain insulators had become exhausted. Waiting for delivery from a mail-order supply house was out of the question at this stage of the game and, as a result, the problem was solved — ham style — as follows:

A plank of well-seasoned hardwood was ripped into several sections measuring 1½ by 1½ by 12 inches. A groove was then cut down the middle of each side of each piece. Each length was then cut into 3-inch blocks and drilled to accommodate guy wire. Final treatment consisted of a boiling in beeswax. Fig. 1 is a drawing of the finished product.

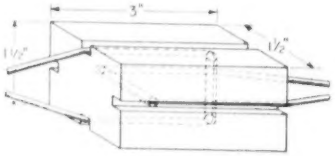


Fig. 1 — A homemade strain insulator used by W9ALU.

— Harley L. Christ, W9ALU

POWER-SUPPLY HINT

WHEN a tube such as the 807 is used, it is frequently desirable either to increase or reduce the power-supply output voltage, depending on the mode of operation — 'phone or c.w. If the power transformer is one designed for two levels of output voltage, the change from high to a low voltage, or vice versa, can be made quickly and inexpensively by employing the circuit shown in Fig. 2. This particular supply will deliver either 600 or 750 volts d.c. and selection of the desired voltage is made by inserting the Type 5R4GY rectifier either in the left- or right-hand socket.

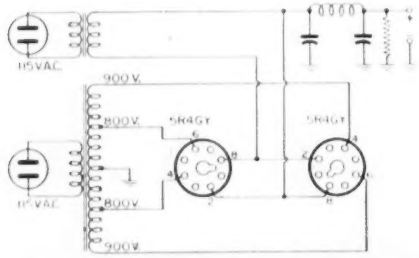


Fig. 2 — Simple method of selecting voltage output from dual-type power transformers.

Thus, the cost of an expensive well-insulated high-voltage switch is replaced by the small expenditure for an additional tube socket.

CAUTION: Be sure power is off and filter discharged! — *Gerald L. Collins, W4ZPX*

SIMPLE CONTINUITY TESTER

TWO or three flashlight batteries wired in series with a pilot lamp and a set of test leads makes a convenient, inexpensive and simple tester for making some types of continuity checks. — *Dana Terrill, W8MQS*

HANDY MOUNTING FOR THE NEON BULB

A SMALL neon bulb may be protected against breakage by mounting it inside a plastic dental floss container (Johnson and Johnson "New Era," pocket size) as shown in Fig. 3.

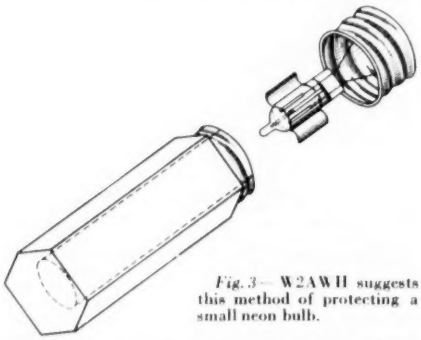


Fig. 3 — W2AWH suggests this method of protecting a small neon bulb.

The hexagonal cross section of the case reduces the possibility of the assembly rolling off a table or bench and the length of the insulated container makes it safer to probe high-voltage circuits.

Three or four radial fins of Scotch Tape, fastened to the neon bulb, are used to center the bulb in the container. The pigtail leads for the bulb should be soldered to the inside of the metal cap of the case. The bulb, with its fins attached, is forced into the container, and the cap is screwed on. — *Yardley Beers, W2AWH*

REPAIRING CERAMIC OR ISOLANTITE COMPONENTS

A BROKEN ceramic or isolantite component (insulator, condenser support bar, etc.) can be quickly and effectively repaired by using Plastic Tile Cement to secure the break. The cement is sold by many hardware stores for approximately 35 cents per can. This manner of repair is not recommended for parts that will be subjected to great stress. — *Sy Greenberg, W2IHE*

CURING REGENERATION IN THE BAND-SWITCHING KILOWATT

THE following will be of particular interest to those who employ the circuit described in "High-Power Pi-Network Amplifier with Parallel Tetrodes," *QST*, May, 1954. One such amplifier, bothered by a case of persistent regeneration, was made completely stable by removing one tube from the circuit. Because of this, it was suspected that screen-circuit difficulties were involved. This reasoning was substantiated, and a cure effected, by installing a screen-trap arrangement suggested by the diagram of the Collins KW-1. The circuit as applied to the parallel-tetrode amplifier is shown in Fig. 4.

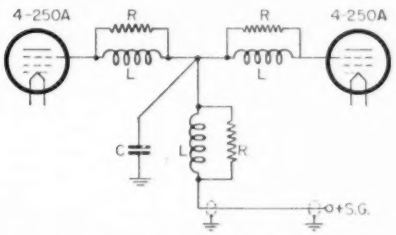


Fig. 4 — Circuit of the screen trap for the high-power pi-network amplifier.
C — 470-$\mu\mu$f. ceramic.
R — 47 ohms, 2 watt (carbon).
L — 5 turns No. 18 or 20, ½-inch diam.; wound around associated resistor in each case.

As installed in the amplifier, the traps are mounted above the chassis deck with the by-pass capacitor returned to a grounded lug located at the base of the tubes. The 330-$\mu\mu$f. ceramic capacitors — all four — used to by-pass the screen grids of the original amplifier must be removed from the circuit when the traps are installed. Of course, the incoming screen-voltage lead is made with shielded wire. — *Willard Bridges, W1NWO*

QST ARTICLE INDEXING HINT

IF the table of contents is removed from each issue of *QST* and pasted or filed in a loose-leaf binder, it simplifies the task of locating articles or subjects that have been presented in back issues of the magazine. This monthly indexing system is particularly helpful during a current year, prior to the appearance of the annual index in the December issue.

— *Charles Stouth*

ELECTRIC FENCE WIRE FOR ANTENNA USE

MANY newcomers may not be aware that some supply houses and hardware stores carry ½-mile spools of "electric" fence wire. This 18-gauge wire is labeled as being 30 per cent copper and sells for approximately $9.00 per roll. The fact that it is light in weight and is quite strong (it has a steel core) should interest the long-wire antenna enthusiast. No specific claims for its efficiency as a conductor of r.f. are made at this time, but it is known that 1000- to 2000-foot open-wire TV feed lines have been successfully made with the material. Another added feature of the wire is that the stuff is almost invisible when erected at heights of 30 to 40 feet.

An antenna using electric fence wire has been suspended here at W4ZZ for the past several months and has taken some pretty stiff winds. This radiator is 420 feet long and is supported by a pair of trees located 440 feet apart.

Incidentally, because of the low copper content, the wire does oxidize quite quickly. It is therefore recommended that the wire be treated with plastic spray before it is erected. — *Herrick B. Brown, W4ZZ*

HOMEMADE QSL CARDS

MAKING QSL cards at home is not a novel idea, but it is a practice that will save the new operator quite a few dollars — dollars that can be invested in gear for the new station.

To make QSLs it is first necessary to have a rubber stamp made up. The cost of a stamp that prints the usual station and contact data and a matching ink pad is approximately $8.00. The stamp used here at W9UWU is sized for use on standard, stamped government postal cards.

It is advisable to run the cards off in fairly large batches because the pad must be heavily inked to allow the stamp to render a dark impression. Since the ink tends to soak into the pad with time, it is not economical to resoak the pad to make cards in small quantities. About 35 cents worth of ink will last for the printing of 500 cards. — *Tim Hart, W9UWU*

NEW SHIELDING TRICK

RECENTLY we were bothered by a case of hum in a newly built receiver. It was suspected that more shielding would turn the trick, but we did not wish to remove half the components to make the necessary corrections. With an assist from the XYL the problem was quickly solved.

A piece of aluminum foil (the type used in cooking) was trimmed to the approximate size required and a length left attached for grounding. Then a piece of "Mystik" tape, a cloth-backed tape with excellent adhesive power, was attached to the foil and trimmed to size. A similar piece of tape, slightly larger, was attached to the other side of the foil and bent around the edges.

This shield could then be wrapped tightly around the components and leads in question and revealed in a few moments the source of the trouble. In fact, it worked so well that it was permanently attached. The tape has a tendency to "set" with time and makes an excellent shield.

— *George P. Carpenter, W1TGV*

A NOVEL DIRECTION INDICATOR FOR ROTARY BEAMS

THE choice of a method of coupling feeders to the rotating portion of a beam usually results in a compromise. The three methods generally

used are: (A) inductive coupling, (B) brushes, (C) direct feed.

Inductive coupling and brushes have the advantage of continuous rotation of the beam. On the other side of the ledger is the difficulty of adjustment of inductive coupling, and maintaining uniformity of spacing between the coupling loops. Brushes have a habit of getting dirty and also give a discontinuity in the uniformity of line impedance. Direct coupling avoids these difficulties but raises the problem of twisted and broken feeders. One attack on the problem is the use of limit switches. However, another approach to this problem has been used at W2OXR which permits continuous rotation within reasonable limits without fear of snapped or twisted feeders. Our direction indicator informs us not only where the antenna is pointing but also how many times the feeder is wrapped around the mast. The feeders are loose and can be wrapped around two or three times safely.

Our method is as follows: A transmitting synchro is connected to the worm gear that drives the main gear of an old Mims rotator. The receiving synchro in the shack is coupled to a surplus Veeder Root counter (one buck in surplus) which counts the rotations. The ratio of the worm gear to the main gear is 32:1, so we set the counter to 0 on north, so that 8 indicates east, 16 south, 24 west, 32 north again, and 40 east again. The number 64 is also north, but it indicates that the feeders are wrapped twice around the mast — a little close for comfort. The mast can also be turned west from the zero position so that 92 represents west, and so forth.

A more satisfactory arrangement would exist with a 36:1 turns ratio, for then a counter showing tenths of a rotation (available at the same price) would read directly in degrees for the first time around.

Use of this system is facilitated by having a great-circle map on the table with the counter numbers written around the outer rim, which immediately again translates the bearing into counter numbers.

This system has been in use at W2OXR for over a half year with gratifying results, and adaptations of this system should be useful to others.

— *Reuben E. Gross, W2OXR*

[Editor's Note: We wish to extend credit to Clarence Gilley, W6NOB, for originality of the "Crystal Socket Hint," page 42, June, 1954, *QST*. WN3WZX did submit the idea as indicated, but not until some time after W6NOB had forwarded the information!]

MODULATING THE GRID-DIP OSCILLATOR

Frequently, a modulated r.f. signal is required for use around the hamshack. A simple solution of the problem is to modulate the grid-dip oscillator with an audio signal. A suitable circuit for this is shown in Fig. 5. A 6AK5 is used in an *R-C* audio oscillator having a fixed frequency of approximately 600 c.p.s. The output of the audio oscillator is capacity coupled to the B-plus circuit of the g.d.o. by means of a 0.1-μf. paper condenser. S_1 provides a means of turning the audio on and off without having to turn off the B plus and filament voltages. If desired, a 0.5-megohm potentiometer may be inserted between R_3 and ground to provide a variable output frequency from 600 to 1000 c.p.s. In this case, R_1, R_2 and R_3 should be changed to 0.15 megohm.

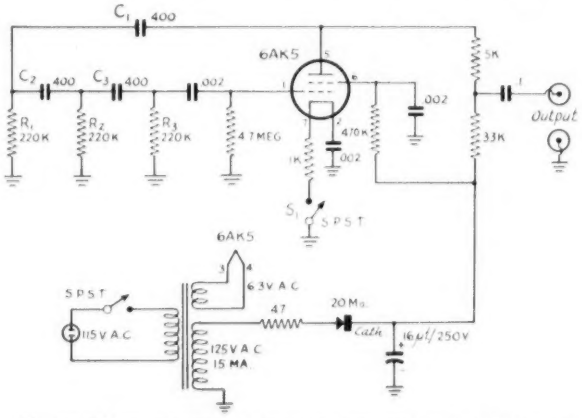


Fig. 5 — Schematic diagram of the audio circuit used by W6RET for modulating a grid-dip oscillator.

All resistors are one-half watt ±20 per cent, and all condensers are 500 v. d.c. ±20 per cent disk, paper or mica. C_1 through C_3 and R_1 through R_3 are the frequency-determining network. Any changes in their values will result in a different audio frequency. The following table indicates approximate frequencies obtainable with various values of *R-C*.

	200 c.p.s.	*500 c.p.s.*	*1000 c.p.s.*	*1500 c.p.s.*	*2000 c.p.s*
R_1	0.52 meg.	0.22 meg.	0.2 meg.	0.12 meg.	0.082 meg.
R_2	0.52 meg.	0.22 meg.	0.2 meg.	0.12 meg.	0.082 meg.
R_3	0.52 meg.	0.22 meg.	0.2 meg.	0.12 meg.	0.082 meg.
C_1	500 μμf.	400 μμf.	250 μμf.	250 μμf.	250 μμf.
C_2	500 μμf.	400 μμf.	250 μμf.	250 μμf.	250 μμf.
C_3	500 μμf.	400 μμf.	250 μμf.	250 μμf.	250 μμf.

In the g.d.o. here sufficient space and power were available to build the audio oscillator as an integral part of the g.d.o. In smaller commercial or homemade models sufficient space or power may not be available to do this. The audio oscillator may then be constructed on a small "minibox" with its own power supply. — *W. W. Deane, W6RET*

•Technical Correspondence—

TV RECEIVER RADIATION

407 Bronson Road
Syracuse, New York

Editor, *QST*:

Your August editorial has sprouted some thoughts which I've been meaning to write to you about for some time. Having been a field service engineer for radio and TV for the past six years, I've been a lot closer to this problem of ITV than most hams . . . in fact, the proximity has at times been downright painful! First off, I question your rather blunt statement that only *lousy* TV receivers are the cause of this interference. My experience indicates that *all* TV receivers, regardless of product affiliation, pour out more of this hash than they rightly should. Naturally, some are a lot worse than others, but I have yet to encounter one particular make that could be considered clean. However, before I become involved in a discussion of comparatives, let me just say I agree with you . . . there is just too durn much hash coming out of these flicker boxes. In time, I feel sure the degree of radiation will be greatly reduced, whether it be by FCC dictum or industry agreement. The primary problem, as I see it, is the fact that we hams have somehow got to get along with the some thirty million existing TV sets which are now squirting birdies into the ham bands day and night. The clean-up, if and when it comes, is not going to take place overnight . . . which brings me to the second phase of this letter.

Can the average ham, should he feel so inclined, take corrective action on one or several offending receivers, provided, of course, he has the owners' permission? (Some of the more enthusiastic will, of course, want to take action without permission.) The answer is a very definite "yes." My field experience shows that the average TV receiver is so "wide open" that just two simple corrective measures will reduce the radiation by a factor of at least four.

The bothersome radiation consists of two primary components: (1) Harmonics of the horizontal output circuits. (2) Video "hash" generated by the video output stage and radiated primarily by the video lead running to the grid or cathode of the picture tube.

The latter component is particularly troublesome in fringe areas where a good percentage of the video drive delivered to the picture tube consists of "snow" — in effect, a wide-band noise generator with an output of half a watt or more, depending on the receiver.

Component (1) is radiated mainly by the receiver's line cord and is, of course, fed into the house wiring which all too often makes a dandy antenna. Some receivers have a.c. line by-passes which should take care of this and on these sets merely reversing the line cord in the socket will help. Line by-passes (.01 or larger at 600 volts d.c.) connected directly at the line cord entry point into the chassis are nearly always beneficial. A high-pass filter in the TV antenna lead sometimes does a lot of good in preventing component (1) from being radiated from this point. A good test here is to remove the TV transmission line (get it as far away from the set as possible) and note if the interference diminishes. If it does, a high-pass filter will help.[1] Considerable radiation takes place from the horizontal circuit wiring and also from the deflection yoke itself. Some manufacturers have applied shielding of a fashion to the wiring between yoke and chassis, usually in the form of a paper tube covered with metal foil. Some small improvement can result by shielding these leads but like TVI, once the stuff is bottled up at one point, it pops out at another. Heavy radiation occurs from the face of the picture tube and the answer here is leaded glass in place of the regular safety glass — if you can afford it. The armed forces use some that does a dandy job but I understand the cost is prohibitive.

Component (2) can usually be licked very easily by shielding the video output lead. A form of shielding which does not introduce too much capacity is theoretically called for here because too much capacity between the video lead and ground can reduce high-frequency response. Metal braid wrapped loosely around the lead and grounded to the chassis does a good job.

Some servicemen have gone all out in efforts to reduce radiation with such measures as complete screening of the cabinet interior and shielding of all exposed wiring (even speaker leads) but it has been my experience that the main points mentioned — line by-passing, high-pass filter and video lead shielding — reduce the radiation to a point where further measures are of doubtful value unless one has facilities for accurately measuring the degree of improvement obtained.

— *Jack Najork, W2HNH*

[1] Proper precautions should be taken in installing a high-pass filter when the receiver is of the type having the chassis connected to one side of the power line. Do not connect the filter case directly to chassis, but through a 0.01-μf. 600-volt ceramic condenser. — Ed.

OFF-CENTER-FED ANTENNAS

Georgia Institute of Technology
Atlanta, Ga.

Technical Editor, *QST*:

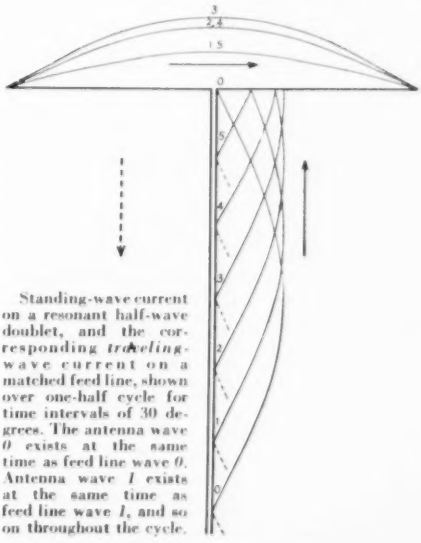
I would like to take issue with the theoretical discussion which appeared in the National Company's advertisement on page 73 of *QST* for June 1954.

I believe Mr. Hadlock, who signed the monograph, is in error when he states that variation of the feed point about the vicinity of a current loop of a resonant antenna does *not* produce a resistance line termination. Schelkunoff and Friis discuss this off-center feed business on page 338 of their book entitled "Antennas, Theory and Practice" and show that it is even practical in the ground-plane case.

While it is true that the feed line of the "All-Band Antenna" radiates, this radiation is not caused by any such phenomena as continuation of the antenna standing-wave current distribution down the feeders. In the matched case there is a standing wave on the antenna, of course, but the feeder current is a *traveling wave*. The geometric relationship between these two waves is illustrated in the attached figure, which shows one-half cycle of time broken down into thirty-degree (1/12 cycle) intervals. A little study of this figure will certainly reveal that (neglecting radiation and inductive coupling) off-center balanced feed is theoretically possible by changing the characteristic impedance of the feed line to match the voltage-current ratio at the new feed point.

As I mentioned before, the feeder does radiate, but this is due to mutual coupling between the antenna and feed line, the same sort of thing that makes the parasitic elements of a beam radiate.

— *William B. Wrigley, W4UCW*



Standing-wave current on a resonant half-wave doublet, and the corresponding *traveling*-wave current on a matched feed line, shown over one-half cycle for time intervals of 30 degrees. The antenna wave *0* exists at the same time as feed line wave *0*. Antenna wave *1* exists at the same time as feed line wave *1*, and so on throughout the cycle.

YL NEWS and VIEWS

BY ELEANOR WILSON,* W1QON

YLRL 15th Anniversary Party

CONTEST PERIODS

'Phone —
Starts Saturday, Dec. 4th, at 12 noon EST.
Ends Sunday, Dec. 5th, at 12 midnight EST.
C.W. —
Starts Saturday, Dec. 11th, at 12 noon EST.
Ends Sunday, Dec. 12th, at 12 midnight EST.
Operate no more than 20 hours on 'phone and/or 20 hours on c.w.

Vice-president W6KER has advised us that YLRL Party rules are under study with the thought of making various revisions. The membership has already been polled, and the results will be considered in formulating rules for next year's contest. For this year, however, rules will be the same as those in effect last year and as here published. Have fun!

Name _____ QTH _____ 'Phone or CW _____
Call Sign _____
Date _____

Time		Station Worked	QSO No.		RS-RST	Freq.	State	Operating Time
From	To		Sent	Rec.				

Suggested YLRL Party entry form.

Frequencies: All bands may be used. Cross-band operation is permitted, but only 'phone-to-'phone and c.w.-to-c.w.

Eligibility: This contest is open to all licensed YL or XYL operators throughout the world (*not* restricted to YLRL members). Contacts with OMs do not count — the YL-OM Contest will be held at a later date.

Procedure: Call "CQ YLRL."

Exchange: QSO number; RS or RST report; name of state, U. S. possession, VE call area, or country.

Scoring: a) 5 points for each contact. Same YL may be worked on other bands for additional credit. *b)* Add number of points and then multiply by number of different states, U. S. possessions, VE call areas and countries worked. (Maryland and District of Columbia count as one state.) *c)* All 'phone contestants running 150 or less watts input *at all times* may then multiply the final score by 1.5. All c.w. contestants running 150 or less watts input *at all times* may then multiply the final score by 1.25.

Awards: A cup will be awarded the highest-scoring entry in each category — 'phone and c.w. These cups are awarded on a yearly basis. Any operator winning the same cup three times gains permanent possession of it. Second and third place awards will be donated. Certificates will be awarded to the high scorers for 'phone and c.w. in each U. S. call area and in each country.

Logs: Copies of all logs must be postmarked not later than Dec. 31, 1954; to be sent directly to Gilda Shoblo, W6KER, Vice-President YLRL, 3715 Liberty Blvd., Southgate, Calif. (When submitting copies of logs, please list 'phone contacts and c.w. contacts separately.)

My Gal
by Raymond Cotton, W1BTY

The final's plates may seem to drip
From running too far off the dip;
The modulator makes with chatter
For loading is a minor matter.

The bath's hung full with lingerie
That somehow wasn't put away;
I don't ask why, 'cause I can guess
This was her day as NCS.

My wilted shirt will have to go
Me for another day or so —
"I would have fixed one for you, pet,
But today the YL ham club met."

Tonight I dined on beans and bread,
Did the dishes — made the bed;
She'd taken off just after dawn
To keep the c.d. station on.

But when I spend a wad of cash
On mobile gear and such like trash
That might have bought an evening dress
Or a new coat — sure nothing less

She smiles and strokes her VFO,
And says in voice both sweet and low,
"It's OK, dear, the old things will do."
God bless her soul — she means it, too!

And when I sit up till the dawn,
When the annual SS is on,
She never scolds or spoils my plans
Because the good gal understands.

So I've no cause the day to rue
I taught her code and theory, too.
We now see all things eye to eye;
A lovely gal — a lucky guy.

Keeping Up with the Girls

Two more of the young YLs whose photos appeared in the June column have become General Class — W5AXC, Margaret, and K2ECD, Nancy. . . . VE3AJR, Dell, tells us that there are now six YLs in North Bay, Ontario: VE3s BFE DUZ DVO DVU DVV and ERJ. . . . Several new hams are grateful for the help that W4AAN, Audrey, of Mobile, Alabama, gave them while studying for licenses. . . . W8HUX, Marvel, is PAM for the Ohio section. . . . W4TOG, Jane, was elected secretary of the Montgomery (Ala.) Amateur Radio Club. . . . After two years of QSOs and traffic handling (in French!) with VE2AOB, OM W1SRM had the pleasure of a personal visit with Stella and her OM at Quebec City. . . . W7SFR, Lorraine, reports that members of the Nylon Net gave amateur radio favorable publicity during a radio interview conducted at the QTH of VE7ALW. . . . Congratulations to W3OQF, Barbie, and OM W3MAX upon the arrival of their second son on August 26th. . . . W1YYM, Ellen, continues to catch some interesting contacts — ST2NG (Sudan) on 14 Mc., KC4AB (Navassa) and F8WF/FC (Corsica) on 7 Mc. . . . KH6AFN, Jeanette, is KH6 district chairman for the YLRL.

YLs You May Have Worked

W6WRT, Ruby Word, suggested a story on W4DEE, ex-W6NLM, for since moving East a few months ago

*Yl Editor, QST. Please send all contributions to W1QON's home address: 318 Fisher St., Walpole, Mass.

Beulah Barrick has been much missed by her many West Coast friends.

President of the Los Angeles Young Ladies Radio Club for the 1952–53 term, Beulah was a faithful member and net control of the Mission Trail and Macan 4 — both daily nets for years.

Nets and traffic handling are her chief interests, and for relaying messages in a California emergency she received a Public Service Certificate.

Beulah discloses that she became a ham in order to do the same thing her OM did regularly — talk to friends back

home. Within six months in 1949 determination won her a Class B license and one year later a Class A.

Now set up at Falls Church, Va., until her OM W4DEM is transferred again by his employer (FCC), Beulah is still hunting for other YLs using single sideband to keep her company on the high end of twenty.

Ever interested in YL clubs, Beulah recently accepted appointment as assistant secretary of YLRL, and she is eager to help with the organization of a YL club in the Washington, D. C., area.

Two junior operators complete the picture of a busy and popular YL.

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

ex-W1AUK, William Smith, New Haven, Conn.
W1DGW, Melvin I. Hill, West Springfield, Mass.
ex-W1LXQ, Clovis N. E. Fontaine, Newburyport, Mass.
W1OAR, Edwin R. Barney, Waltham, Mass.
W2LWA, Joseph Thomas, Fort Edward, N. Y.
W3FVX, Amos B. Collins, Cheverly, Md.
W3ONA, Quentin H. Ryder, Luzerne, Penna.
W4DIN, Laurence P. Geer, Tampa, Fla.
W4ETN, Arthur F. Weston, Chattanooga, Tenn.
W4NSX, William G. Tuller, Falls Church, Va.
W5MNY, Robert C. Harris, Roff, Okla.
W5TY, Francis J. Riley, San Antonio, Texas
K6BYU, Burton M. Foster, Inglewood, Calif.
ex-W6WOD, Carl Voigt, La Crescenta, Calif.
ex-7KJ, W. W. McGoffin, Seattle, Wash.
WØFHM, Hans C. Palm, Boulder, Colo.
VE1XR, Ralph H. Strong, Halifax, N. S.
VE2NV, J. Aurele Demers, St. Joseph de Sorel, Quebec
VE4FF, D. I. Gue, Edmonton, Alberta

M.A.R.S.

Pan-American Service

The Military Affiliate Radio System was instrumental in helping to bring information from home to a Paraguayan delegate of the Pan-American Union, it has been revealed by Michael Lever, press and information officer for PAU.

In a letter to the Chief Signal Officer, USA, and the Director of Communications, USAF, Mr. Lever disclosed that Senora Maria Concepcion de Chaves, Paraguayan delegate and chairwoman of the Inter-American Women's Commission, had requested his office to confirm a rumor that her son, Major Manuel Chaves, had been wounded during the recent Paraguayan revolution.

Mr. Lever said, ". . . We resorted to a number of press and government facilities, among them MARS, in an effort to obtain this information as rapidly as possible. MARS had the answer for us — and a favorable one, at that — within forty-eight hours."

MARS Sends Messages for VFW Delegates

Delegates and guests of the Veterans of Foreign Wars annual encampment, August 2nd–6th, found a MARS message center set up in Convention Hall, Philadelphia, for the purpose of sending personal greeting messages to their friends and relatives at home.

Sergeant First Class Thomas Mears and Robert Voeks, Army Signal Corps personnel assigned to MARS Headquarters Station WAR, Washington, D. C., operated and maintained the station facilities at Philadelphia. A wire circuit linked the convention with WAR in Washington. Messages were transmitted via normal MARS channels.

Fred V. Collins, A9QN (Red Fox 3 on CAP net); Ed Riefstahl, engineer with the local public service company; Jack Riefstahl; and Fred Jenks, USNR, operate from Collins' personal station at Des Plaines, Ill., during a CAP search and rescue mission.

Strays

Connecticut made it a "VAS" — Visited All States — for W0YYW who dropped in on ARRL headquarters during August.

—···—

At least 77 amateurs are included among Shell Oil, Chemical, Development and Pipe Line organizations personnel.

—···—

W2AQJ read a newspaper report about connivers (nonamateurs) who employed "pocket-sized frequencies" for the by-passing of race-track wire services.

—···—

The Division of Adult Education, Glen Cove Public Schools, Glen Cove, N. Y., features in its curriculum a course in amateur radio with W2WMT instructing.

—···—

W6HC says that the amazing similarity, both transmitter and vocal, in the 75-meter 'phone outputs of K6FW and W6FW is driving West Coast round-tablers to distraction.

—···—

The Rio Grande Amateur Radio Club of Edinburg, Texas, maintains for members a lending library of electronics literature. One member serves as librarian and keeps a thorough up-to-date card index file. Should someone desire information on, say, "end-fire beam antennas," ready reference is available.

Hams in Hollywood. . . . On the set of "The Eddie Foy Story" during August an on-the-spot photog caught (from left to right) producer W6VLH, actor George Tobias, sound recorder W6MU, some unidentified friend of Bing Crosby, visitors W6DI and W2KH, and sound-mixer W6CJ, all enjoying a friendly chat.

Admiral Noah Phillips, WN5FMX, is in the Air Force at Biggs AFB, Texas.

—···—

To keep his *Call Book* untattered and untorn, WNØVWZ puts an easily obtained telephone directory cover to work.

—···—

Upon hearing that her school teacher, W4ZPE, had an amateur radio station, a zealous piano-playing young pupil offered her talents for the "next W4ZPE amateur program."

—···—

"Captain Stay-Put" Kurt Carlsen, W2ZXM and W2ZXM/MM, now has himself a ham family. Daughters Sonia, 14, and Karen, 10, are KN2s ITV and JAT, respectively.

—···—

W2RPI points out that WN9DWH, who prefers A3 operation, bears the name C. W. Hamm. Take it easy on the kidding, though — Mr. Hamm is a police sergeant. (Wonder if he has QSOd W4NYX.)

—···—

W1AQC recommends "Chektape," a product of the Chektape Co., Stamford, Conn., for the mounting of QSLs. It is adhesive on both sides, easily removable and, because it will not adhere to oily surfaces such as skin, is conveniently applied.

—···—

W6OA recently suffered a broken leg and other injuries in process of being robbed and he mentioned this misfortune over the air to 15-year-old rabid ham KL7AQU. Young Dennis, with true *esprit de amateur*, sympathized, "Gee! It's too bad it couldn't have happened in the spring so you could have been home to work all the nice DX coming through."

—···—

In late September W6QE accepted two messages from KL7AIZ on 40-meter 'phone. One was destined for a San Francisco party and the other was addressed to K6DMI whose QTH was not supplied and who was unlisted in W6QE's *Call Book*. Undaunted, W6QE (1) sallied forth on 75 meters, (2) blasted a hopeful CQ, (3) *received a reply from K6DMI*, and (4) unloaded the K6DMI message. To top this sequence, W6QE asked K6DMI if he would mind accepting a message for so-and-so in San Francisco. K6DMI replied: "Not at all. She's my daughter."

—···—

K2s EIT and EIU are Kenneths Kohler and Keeler.–W1YON

How's DX?

CONDUCTED BY ROD NEWKIRK,* W1VMW

How:

This month it is our good fortune to be favored with an encore by an old acquaintance — Count U. R. Kuntries. W2HSZ fortuitously was taking notes while the Count performed as guest speaker at ceremonies according Chief Eager Eagle's tribal reservation the status of Honorary Country on the ARRL DXCC Countries List. The Count's revelation of his newest and most revolutionary DX hunting accessory should be of moment to any DXer who for years has searched in vain for a clear frequency on twenty meters.

Der Channelmeister

Der Channelmeister ist ein devisen vas ist controllen das eagerbeaveren vas iss outgaben mit der rotten signallen und operaten tekniks vas iss gestunken. Id donner und blitzens der dumbkoff vas iss gesitten und QRMen mit der noodle nicht operaten.

Vor examplen, ein VQ5 iss outgaben mit ein sweetzounden "CQ CQ ANS 20 UP." Der dumbkoff commencers mit ein callen zerobitte.

"Vas ist das?" der VQ5 ist inquiren.

"*Zum Teufel! Iss ein grosser dumbkoff!*" der Channelmeister ist geroaren und ist commencen mit der donner und blitzen. Das servos ist gefeeden signallen to ein computaren; der computaren iss gemaken mit der liddle pipsers; der liddle pipsers ist controllen ein king-sizer rocketen; und der rocketen haben ein king-sizer attem bummer.

"*Achtung!*" hollaren der Channelmeister. "*Drei! Zwei! Ein! Schweinhund, releasen der rocketen!*"

Mit ein softsmiler on der face, der VQ5 iss (1) gepullen ein leveren, (2) pushen zwei buttonen, und (3) iss gesitten mit der handsers gefolden. Der rocketen iss gemaken mit ein "*SWOOSH!!*"

Der QRMen dumbkoff mit der noodle vas iss nicht worken? Ach, der Silent Keysers haben gelisted ein neue callen und der VQ5 channelen iss geclearen as der bell!

Schnapps, anyone?

What:

Our annual African upsurge now is dominant from 3.5 to 21 Mc. and the hunt is on for the likes of **ET3S**, **FB8BK**, **FE8AN**, **FR7ZA**, **VQs** 6LQ 8CB, **ZDs** 3BFC 6BX 9AC, **ZSs** 8D and 9G. And, if you tire of Africans, there are CR8 FG7 LB7 VR4 VS4 VU5 YA1 ZC7 and ZM7 items on tap.

Twenty 'phone is elected to lead our band parade this month and we find the A3 gang really rollin'. W7KWO, for instance, has 18 countries worked while mobile, including a chat with **VS2EB** (145) 6 *PST* . . . . . . W5UUK caught that VS2 as well as **KAØIJ** (235) 7 *CST*, **KR6KS** (220) 7, **KX6AF** (230) 7 and **VP2DN** (60) 15 . . . . . . A3 enthusiast John of Fortville, Ind., whose call sign inadvertently disappeared with his letter's envelope, raised **AG2AB** (172) 14, **CRs** 5SP of Sao Thome, 6BX, **EL2X** (105) 22, **OD5BA**, **OQ5FO** (127) 14, **VP2AD**, **VQ2DT** (117) 20, **ZBs** 1DM 2A (127–143) 19, times *GMT* . . . . . . KA2AK (ex-KJ6AY) hears Palmyra Islander **KP6AK** scheduling KH6SL on Sundays, 14,220–14,240 kc., at 2100 KA time . . . . . . Norfolk's **VK9OK** (110–125) 2–4 *GMT* came back to W2WZ, while **HH3DL** (178) 19 *EST* and **VP3LF** (140) 17 entertained W9EU . . . . . . **AG2BC** (143) 9 *GMT*, **CRs** 4AD (108) 19, 4AL (115) 21, 6BE (190) 19, **CS3AC** (310) 10 of the Azores, **ET2ZZ** (187) 18–19, **FK8AO** (152) 4, **FM7WN** (150) 16, **FO8s** AB (150) 22, AC (120) 3–6, AD (153) 11, **FR7ZA** (195) 10–11, **HI6EC** (170) 20, **JY1SY** (250) 10–11, **KC6AA** (228) 13, **KJ6FAA** (200) 14, **KT1WX** (175) 17, **LX1DU** (193) 15–16, **MF2AA** (150) 8, **OD5AB** (112) 19, **OE13JM** (170) 14–15, **OQ5s** CX (120) 20, EC (140) 19–20, FN (130) 15, FO (127) 14, **PJ2AQ** (132) 18, **ST2NW** (123) 20, **SVØWA** (126) 22, **TA2EFA** (192) 13–21, **TG9BH** (200) 20, **VKs** 1BI (164) 5, 1HM (172) O, 9OK (125) 3–4, 9SP (142) 23, **VPs** 1GG (145) 15–16, 4LZ (186) 8, 8AZ (50–150) of Grahamland, **VR2s** CY (150) 4, **VS4HK** (47–97), **YA1AA** (198), **YK1DF** (182) 17–18, **ZB2Z** (108) 15, **ZDs** 3BFC (105–300) 17, 7BB (152) 16, **ZE6JI** (135) 13, **ZM6s** AC (180) 0, AL (127–155) 3, AP (115) 5, AT (160) 4–5, **ZS3B** (115) 18, **4X4AB** (132) 15 and **5A4TY** (120) 16 are 20-meter radiotelephones spotted by the West Gulf DX Club *DX Bulletin* gang . . . . . . Many of the aforementioned and **C3AR** (285) 0 *PST*, **EAØAC** (150), **KB6AO** (210) 23, **ZC5VS** (70) 3, **ZDs** 1SW (136) 20, 9AB (210), **ZE1JX** (130) 16 and **ZP5GF** (186) 7 are listed in So. Calif. DX Club's *Bulletin* . . . . . . *Newark News* Radio Club members closed in on 14-Mc. voicers **CN2AD**, **CP5s** AB EK EQ/CP6, **EAs** 8AP (120), 9AR 19 *EST*, 9DF, **EL9A** 15, **FC8AB** 18, **FF8s** AK AP 14, **FM7s** WD WM, **FP8AP** 18, **GDs** 3ENK 3UB (110), 6IA, **HI8WF**, **IT1BXX**, **KA2s** AK AL AP CK CR ED FC JM LG MB MO NY USA WL WW, **KA3RR**, **KA4MA**, **KA7s** BM DM FL LJ LK, **KA8s** AB BX, **KA9MF**, **KC6UZ** (208) 3, **KG6ABN** (200), **KM6AX** (285) 1, **KR6s** AX OG, **KT1s** LU PU (335), **KW6BB** (255), **LU1ZA** (175) 8, **M1IE** 17–18, **OD5s** BA (155) 16, DO 17, **OEs** 1 PC (150) 17, 1WH (195) 13USA (310), **PJ2s** AA AB CH, **SVs** 1SP ØWO (120), **TA3s** AA US, **TG9s** AI FV, **VK9s** DB (185) 1, GV (120), YT, **VPs** 1AB 1SJC 2DH 2KB 3YG, **VQs** 4AC 4ERR 16, 4EZ 5EK (140) 14, 5HEG 18, **VR2BJ** (153), **VS1FK**, **YI2AM**, **YN4s** CB DT, **YO2KAB**, **YS1s** MS 21, RA, **YUs** 1AD 1GM (150) 17–18, 2BG, **ZB1CM** 17, **ZD4AX**, **ZP5s** CF BV, **ZS3E**, **3V8AS**, **4X4s** BK BL FB 14, **5As** 2TC 2TZ 3TF 3TX 3TY 4BR 4TF 4TJ 4TL and 4TU.

Twenty c.w., never in need of descriptive hyperboles, does well by the day crowd but not so well by the night shift. Easter's **CEØAD** (7) 3 *GMT*, **KX6NA** (14) 2 on Majuro, Norfolk's **VK9OK** (73) 2, **VQ5EK** (58) 19, **VR2CY** (19) 2–3, Sarawakian **VS4HK** (97) 16, **ZC7BB** (35) 13 of Jordan and **ZD4BQ** (27) 22 conversed with W2WZ . . . . . . Young W5UUK holds his own with the OTs, bagging **CR6AI**, **CT3AB** (7) 19 *CST*, **EA9s** DF (78) 19, EB, **EL2X** (109), F9QV/**FC** (27–42) 22, **FK8AO**, **FM7WD** (110) 7, **I1YCV**/Trieste, **IS1AHK**, **OD5LC** (18) 17, **SP3AN**

* DX Editor, *QST*.

Most Cook Islands ham activity takes place in the Rarotonga housing facility area shown here. The larger masts visible are those of commercial station ZKS. These diggings are home to (l. to r.) ZK1s BH BI AB BG and AA, the latter not active on the air at present. ZK1AM, not available for this picture, holds forth on Aitutaki Island. ZK1AB has been creating quite a stir with portable operation on various ZK1 islands.

«

(45) 0, **TF**s 3AB (30-66) 23, 5SV, **YI2**AM (64) 18, **ZD**s 2DCP (10) 17, 4BT (69) 19 and several DXpeditions . . . . . **I5**PP (75) 20 *GMT* and **KR6**AA (30–60) 12–13 are among W8YIN's conquests . . . . . **KB6**AY and **YS1**O brought W9MQK to 128/122 . . . . . **FY7**YC (80) 11–12 *GMT*, **OD5**AV (54) 18 and **ZB1**DK (22) 21–22 connected with W2BBK . . . . . W4QCW (KC4AB) got back from Navassa in time to knock off **CR7**LU, **KM6**AX (98) 2–3 *GMT*, **LU**s 1ZS (46) 8, 4ZB (20) 7, 7ZM (68) 14, 7ZO (30–50) 14, OQ5ZZ/**KT**, **OX**3MW, **SV1**AB, Cretian **SV0**WK/9, **TF3**AR, **VQ2**IM (23) 18, **ZD2**J and a YI2 . . . . . W8PCS did away with **CR6**CS (75), **CX6**AD (40), **EA6AO** (78), **HA2**FA (65), **KA7**DM (45), **OQ5**VN (26) 20 *GMT*, **4X4**FC (85). A Corsican made it 114/94 for Ed . . . . . At W3UXX we find **FA8**DA, **OD5**AX and **9S4**AD . . . . . **HA5**BD, **OD5**LX and **ZB1**AUV (15) 21 *GMT* worked W9KXK. Paul also captured several LU "Z" customers . . . . . W9EU swapped c.w. with **CN2**BE (20) 17–18 *EST*, **FA8**AN (67) 17–18 in the Sahara, **FF8**AJ (69) 17, **FO8**AK (47) 17, **FP8**AP (78) 8, **FQ8**AF (79) 14, **HA7**OL (44) 16, **HR1**AA (38) 21, **LZ1**KPZ (49) 14–15, Archduke **OE5**AH (37) 16–17, **PJ2**AB (20) 8, **SP**s 3AK (84) 15, 9KAD (10) 17, **ST2**NG (32) 18, **SV0**s WL (52) 16, SP (45) 16, **TA3**US (35) 17, **VP8**AA (84) 17, **VR3**A (50) 22, **YO**3s GY (54) 16, RD (36) 17, **ZB1**s AJX (15) 17, DK (17) 17 and **4X4**FW (10) 17 . . . . . Some EA9s, **FA8**CR, an OD5, **VQ4**s BNU FG, **YU1**GO and several Antarctican Argentinians answered W9ESQ . . . . . W9UKG climbed to 112/83 by way of **DU7**SV, an FO8, a KX6, **OD5**LJ, **YO3**RF, **ZB1**CH (60) 20–21 *GMT*, **ZP5**GM and **4X4**BN . . . . . **CP3**CA (50) 21 *GMT*, **EA**s 6AW 9AP, **JA**1s AQ TD, **OA4**EU, **VQ4**CF, **ZS3**AH and **4X4**FK climbed aboard the W2HSZ bandwagon . . . . . **OY3**UP (70) hooked W3LEZ, and **KA4**DR (90) likewised W6UED . . . . . An EA9, FY7, **OE**1s GS WH (17) 20 *GMT*, a TF3 and YO3 were victims of W1WAI's fast-rising 81/61 total . . . . . WGDXC gleanings on 20 c.w. feature **AC3**PT (44), **CN2**s AB (72) 22 *GMT*, BA (50) 23, **CP5**EK (100) 3, **CR7**s AD (65) 19, AF (74) 14, **EA**s 8BP (60) 0–15, 8DB (42) 23, 9AB (76) 14, **EL2**P (42) 21, **FF8**JC (74) 20, **FK8**s AC (70) 3–4, AL (55–81) 4–5, **FM7**s WD (100) 23, WP (40) 1–20, **FO8**AB (95) 20, **FQ8**s AG (128) 20–21, AT (12) 16, **FW8**AB (70) 70 of Wallis Isle, **HA5**KB (35) 8, **HR1**MC (15–85) 3–21, **HZ1**AB (50) 2, **IS1**TAW (37) 21, **IT1**AGA (26) 22, Trieste's **I1**NU (35) 14, **KA8**AB (50) 25, **KB6**AQ (155) 4, **KG6**FAA (50) 4, **LZ1**BVP (75) 0, **LU**s 2ZC (29) 13, 2ZI (75) 7–8, 4ZD (48) 7, 4ZM (35) 11, 8ZS (60) 8–13, **MP4**QAJ (45) 14–15 of Qatar, **OD5**DJ (40) 5, **OE1**3JM (86) 21, **OQ5**s ER (40–65) 21, GU (30) 22, **OX3**UD (66) 20, **PZ1**D (50) 0, **SP**s 2AN (20) 1, 2KAC (67) 14, **ST2**s AR (65) 19, NG (18) 23, **TA2**EFA (80) 13, **UB5**KAC (42), **VK9**AU (66–80) 7–8, **VP**s 3FD (54) 17, 8AW (40) 21, **VQ4**s AQ (20) 9, NZK (90) 20, RF (83) 14, **VR2**AS (20) 5, XA1AB "Rhodes — QSL via REF," **ZB1**TD (42) 20, **ZC4**CA (40) 31, **ZD**s 3BFC (109), 6BX (55) 18–19, **ZE5**JJ (25) 19, **ZM6**AL (150–172) 4, **ZP5**s AY (118) 17, EC (79) 16–17, **3V8AN** (83) 16 and **4X4**GC (50) 16 . . . . . SCDXC personnel bore down on many of the aforementioned as well as **FB8XX** 6 *PST*, **VK**s 1EG 7–8 of Antarctica; 1DY 1PG (42) of Heard Isle; 1AC (45), 1DJ and 1GA of Macquarie; 9RH of Norfolk Island, **VP8AZ** (50–150), **ZC5**SF, **ZM6**AS (41) 22 and **ZS3**P (84) 14–15.

Forty c.w. clings to claims of late-hours supremacy, particularly on the north-south paths. W7RME managed QSOs with **HR1**MC, **KM6**AX (40) 7 *GMT*, **KR6**AA, **LU1**ZT, **VK**s 1AC 9YY, **VP8**s AO BE (20) 21, **ZK1**BI and a ZS5 . . . . . **LU**s 1ZS (30) 21 *EST*, 2ZI (3) 1, 3ZB (35) 6, 7ZO (20) 22, **OE3**RE (13) 20, **VK6**s MO (17) 8, SA (27) 7, WT (11) 6, **VP**s 1RS (10) 20, 2GW (29) 20, 8AZ (20) 0 and **YO3**CA (42) 22 came back to W4YHD, now back at M.I.T. . . . . W5WQN did okay with **EL2**X (10) 2 *GMT*, **JA**s 1BU 1CR (20) 12–13, 1GN 6AA, **KG4**s AE AT, **KX6**BU, SP9KAD, **VQ5**BO on the long path, **VS9**AS and a YU3 . . . . . At W9ESQ we find **HC1**LE, **KG4**AN, **KG6**FAA, a VK9, a VP8 and **ZK1**AB . . . . . Luck here and there, at *W1WAI*: **SP3**AN (37) 23 *GMT*, *W2BBK*: **FY7**YC, *W4BXV*: a KC4, *W5UUK*: Corsica, Navassa, an HR1, **VK9**WZ (3) 6 *CST* and several VP8s. *W5WQX*: sundry Oceanians. *W8YIN*: **ZD4**AB (8) 6–7 *GMT*. *W9PNE*: many VKs and **VP6**GT. *WØQMZ*: **CE3**QW, **HK4**DP, a VP8 and numerous Pacific items. *HZ2FE*: Ws 2DNP 2IJU 2TWC 2YTH 3BVN and 3OCU . . . . . 7-megacyclers **CT2**BO (18) 0 *GMT*, **FK8**s AB (37) 10–11, AO (1–37) 10–12, **TG9**AF (19) 6, **VK1**GA (30) 6, **VP2**SH (31) 23 and **ZE5**JJ (53) 23 are nominated by WGDXC brethren, while the SCDXC group designates **CE0**AD (20), **ZC5**SF (40) and **ZD6**BX (43) 8 . . . . . **Forty 'phone** is as frustrating, DXwise, as ever, but W1APA fought through to **KH6**s AFK ATT ZA, **KL7**AWR (245) 5 *EST*, **PY1**TD (260) 22 and **VP9**BO (257) 6 . . . . . W9LMC heard 7-Mc. 'phones **HK4**BD (290) and **ZL2**BE (157) leaking through the b.c. QRM.

Eighty c.w. began its usual lively fall season with considerable reluctance. W3UOE rolled up a flock of Gs, a Corsican F8, **DM2**ABC (14), **EI9J** (6), **HB9**KC (10) ship LUØAAW, handy South American **VP4**LZ (5), and **9S4**AX (10) . . . . . **KH6**PL 5 *CST*, **VK3**s AHH 5, MC 6, **ZL**s 1CI 4–5 and 2AQU 5 responded to W9PNE . . . . . **LU1**ZS (10) *EST* hooked W4YHD, and several East Costers tangled with one VR5EE at strange hours . . . . . KC6AA reports **seventy-five** 'phone activity by several KC6s, this sport centering on 3880 kc.

One-sixty was tapped for **ZL3**RB (1898 kc.) at 3 *CST* by W9PNE, opening the top-band season with a bang . . . . . W1BB and colleagues are hard at work preparing the ground for the coming season's 160-Meter Transatlantic Tests. We'll carry the formal announcement next month. More 160-meter countries are expected to be active than ever before, so Jeeves suggests you check those long-wire radiators without delay.

Ten 'phone is being watched for encouraging signs by 28-Mc. enthusiasts who recall "the good old days." It does bear scrutiny — W6RQQ, running 3 watts A3 to a 5AG7, was enthralled by a sudden QSO with **LU4**AAT (550) . . . . . **HP1**FA, **KZ5**DM, **LU5**DDG, **YV**s 3BD 5GP and others worked voice with W4NQM. We'll close our ham-band inspection on a pleasant note, quoting a letter to W4NQM from J. Virginia Lincoln, Upper Atmosphere Research Section, Radio Propagation Physics Division, National Bureau of Standards U. S. Department of Commerce, anent the sunspot situation: " . . . June, 0.2; July 4.5; August, 8.1; making the twelve-month smoothed numbers as follows: December, 1953, 7.3; January, 1954, 6.3; and February, 1954, 5.5. There is a good possibility that March, 1954, will turn out [to have been] the sunspot minimum but we cannot confirm it until at least the end of October." Okay? *Okay!*

Where:

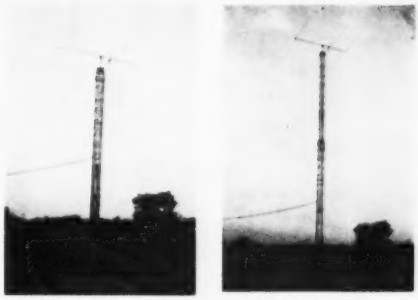
"QSL cards sent by surface mail may never reach KC6 stations. Air mail, however, is very good and the postage rate is the same as U. S. Possessions." This from KC6AA

who keeps a discerning eye on Trust Territory of the Pacific Islands ham doings . . . . The address of FEARL's QSL bureau is: KA QSL Bureau, FEARL, P.O. Box 111, APO 500, % Postmaster, San Francisco, Calif. The QTH as given on page 63, Sept. *QST*, is not valid . . . . As you probably are aware, the roster to follow is not intended to duplicate listings found in the latest *Call Book*. But if you don't have the latest W9TRD directory for a check, send those QTHs to Jeeves, anyway, and let *him* sweat out the dupes. Credit is given whether or not the addresses already have been in print, an "E for Effort," so's to speak. Thanks to W1s APA BDI JNV RDV UED WAI WPO, W2s BBK HSZ WZ, W3VKD, W4YDT, W5s BGP UUK, W6UED, W7PSO, W8YIN, W9s CFT EU KXK, W0IUB, NNRC *Bulletin*, SCDXC *Bulletin* and WGDXC *DX Bulletin* for these items:

CN8HF, 49th Comm. Sqdn., APO 117, % Postmaster, New York, N. Y. . . . . **CN8IA** (QSL to W2ARE) . . . . **CR6CS,** P. G. de Almeida Lopez, P.O. 19, Calulo, Angola . . . . **CX2AM,** A. Mantegani, Box 37, Montevideo, Uruguay . . . . **FA8AY,** Jean Pierre Dentan, Decca Survey Chain, Fort Miribel, Sahara, Algeria . . . . **HH2JK,** P.O. Box 494, Port-au-Prince, Haiti . . . . ex-**HH2OT,** Rev. Herbert T. Cox, 314 N. Millwood, Wichita, Kans. . . . . **HK4BD,** Box 2263, Medellin, Colombia . . . . **HZ2FE** (QSL via ARRL) . . . . **KC6ZB** (QSL via KC6AA) . . . . **KH6FAA,** Box 300, Hickam AFB, T. H. . . . . **KL7AWR,** Kodiak ARC, Box 1168, Kodiak, Alaska . . . . **KZ5HL,** 45th Cavalry, Fort Clayton, C. Z. . . . . **PY1TD,** Paulo Cavalcenti, Ave. Atlantica 3730, Rio de Janeiro, Brazil . . . . **ST2JT** (QSL via RSGB) . . . . ex-**SU1GM,** Sgt. G. Metcalf, 3110027, GI3JDC, Sgts. Mess, RAF, Ballykelly, Limavady, Co. Derry, No. Ireland, U. K. . . . . **TA3US,** J. Gaddens, Navy 525, Box 14, FPO, New York, N. Y. . . . . ex-**VK1FE,** Arthur R. Burton, VK4FE, Gp. P.M., Thursday Island, No. Australia . . . . ex-**VK1VU** (QSL to ex-VK1FE) . . . . **VK7JP,** Leon J. Durkin, Old Coast Rd., Quoiba via Devonport, Tasmania, Australia . . . . **VP6AF,** Arthur Farmer, "Storm's Gift," Flint Hall, St. Michael's, Barbados, B. W. I. . . . . **VP7NG** (QSL to W4PDZ) . . . . **VP8BE** (QSL via RSGB) . . . . **VS4HK** (QSL via RSGB) . . . . **YV4AM,** Victor Medina Iturbe, P.O. Box 76, Valencia, Venezuela . . . . **YV6AS,** P.O. Box 69, Ciudad Bolivar, Bolivar, Venezuela . . . . **ZB1DK,** Flat 9, Alexander Bldgs., Sliema Road, Gzira, Malta . . . . **ZC7BB** (QSL via RSGB) . . . . **ZD3BFC,** P.O. Box 285, Bathurst, Gambia . . . . **ZM6AT,** Box 200, Apia, Western Samoa . . . . **ZP5BC,** N. Ledesma, P.O. Box 133, Asuncion, Paraguay . . . . **ZS5NZ,** A. M. Buchan, Box 73, Weenen, Natal, Union of So. Africa.

Whence:

Asia — The many stations who have contacted HZ2FE may be surprised to learn that he's not a "local BL" but is darned good DX. QSLs should be coming through in short order according to a recent letter from Hussein. We'll have to review his circumstances in the light of DXCC Rule 7, however; he's not in Saudi Arabia . . . . From W9KOK we learn that British authorities continue their efforts to obtain the release of Bob Ford, ex-AC4RF, now imprisoned in China . . . . Although it's painful to pass up the big signal of FI8AH in Saigon, remember that French Indo-China (Cambodia, Laos and Viet-Nam), Iran, Korea, Republic of Indonesia and Thailand still are on record as forbidding international ham work. FCC-licensed amateurs risk official wrath in calling or working FI8, XW8, 3W8, EP-EQ, HL, PK and HS stations . . . . In San Diego ARC's *News* W1WPO notes that W6OME, of



W2MHQ's telescoping mast provides a ready means for observing height-above-ground effects on a 21-Mc. beam. A home-designed winch arrangement varies the antenna's height between 35 and 60 feet on a three-minute time cycle. Between the two heights a 1.2:1 to 1.4:1 s. w. r. variation occurs on the 52-ohm coax feed line. So far, W2MHQ's observations generally confirm the old axiom, "the higher, the better."

TA3AA's staff, returned home after two years in Turkey . . . . Major W7OLB pushes traffic these days at KA2OL . . . . Particularly for those who still need KR6 confirmations, OARC of Okinawa invites attention to "Okinawa Day," a period during which KR6s should be thicker than hairs in Jeeves' sideburns. *Time:* 1501 GMT, December 10th, to 1500 GMT, December 12th. *Bands:* 20 and 15 'phone; 40, 20 and 15 c.w. It's not a contest, just a good chance to collect King-Rogers on several bands. "Unfortunately, some of the hams on Okie do not QSL 100 per cent [but we of OARC] guarantee 100 per cent QSL," writes club secretary W3YKS-KR6OE . . . . Gadabout AFman W6CRV's first impressions of Saudi Arabia include an atrocious noise level, heat, humidity, and the impossibility of obtaining ham tickets. Ron gets in a few licks at HZ1AB, however, where a BC-610 radiates via a 3-element rotary and a 75A-2 receives. "We want to work the States as much as possible but we have heard only a few isolated Ws during the past few weeks." . . . . YA1AA QSLs reportedly are gladdening the hearts of a few lucky customers.

Africa — In a missive to W1WPO, ST2NG mentions the continued availability of ET3s Q and S in Addis Ababa. Lee also scampers down the active-ST2 roster: AC, rebuilding; AR, on c.w. and 'phone; DB, 'phone only; JT, rebuilding; NG, c.w. only; and NW, mostly 'phone . . . . Ex-SU1GM, now GI3JDC, left Egypt in August but reports receipt of QSLs for SU1GM QSOs dated after his departure. He'd like to confirm 'em but 'twouldn't be cricket . . . . The *DX Bulletin* records that EL2X, who needs Idaho to wind up WAS efforts, intends an early bit of DXpeditioning, and that ZD3BFC recently fired up a fancier rig.

Oceania — "Activity is reaching an all-time high in the KC6 area. At the present time there are approximately twenty licensed hams, six of them active. Recently licensed was KC6ZB who is on Yap along with myself. KC6AF and daughter (Novice KC6ZA) are departing for KH6 where KC6AF will teach at the University of Hawaii. All active Trust Territory stations are on 20 meters with KC6AA and KC6UZ also on 40. TT hams work forty 'phone between 7100 and 7150 kc., c.w. between 7000 and 7150 kc. Eighty c.w. and 75 'phone operation is anticipated on

This month the peripatetic "How's" camera visits three well-known "Yanks in Japan" stations. *Left:* the layout of KA4MA, Itami, with 2nd op W4SET in the hot seat. KA4MA has a kw. of s.s.b. into a 450TL final, 51J-3 receiver, a 14-Mc. 3-el. wide-spaced rotary, and is most active on weekdays between 1300 and 2000 GMT around 14,295 kc. . . . . *Center:* Lt. Col. Fred J. Elser, now KA2DX, has been working DX and signing jivy DX calls longer than most DX tyros can remember. C.w., a.m., s.s.b. — you name it and KA2DX can dish it out, preferably on 20 meters . . . . *Right:* the set-up at widely-worked KA8AB, with KA8RT (W8LTJ) at the operating position. By the time you read this Dick will be chasing down DX pals from his Haskins, Ohio, home station.

Alexandre and Eva Perenyi are well-known DX enthusiasts by virtue of their powerful Casablanca station, CN8MM. Twenty 'phone is preferred.

3500-2900 and 3800-3900 kilocycle ranges, respectively." This from KC6AA, who adds that a Trust Territory emergency and traffic net has been formed and that a DXTT certificate award of world-wide availability is in prospect . . . . . W5UUK heard that Heard won't be heard on amateur bands for a spell after January, 1955 . . . . . W5BGP learned from WIA (Australia) that VK1VU gave up hamming after returning to the mainland from Heard Island. Ex-VK1FE, now VK4FE (see "Where"), offers to take care of VK1VU's QSL shortcomings . . . . . Oceanian notes from SCDXC sources: VR3A has accumulated over 4000 1954 QSOs. . . . Ex-VK1RA now signs VK2AEA. . . . ZK1AB continued his Cook Island-hopping through September . . . . . A pair of cute Queensland VKs are 4IC on one of the Willis Islands off the Reef; and 4FE on Thursday Isle, 30 miles off Cape York. . . . . From W4CEN: G2RO/DX continues to keep abreast of QSL obligations. If you think you've been missed, drop another card to G2RO via RSGB, plainly labeling the QSL "recheck" to expedite Bob's paper work. G2RO began a three-month Pacific islands tour in mid-October and will subsequently head for home via VK, ZC2, VQ8 and other African points. Keep a sharp ear out for that potent 15-watter! . . . . . W6MUR will be doing QSL chores for VR3A's *contest work only* and expects to receive Ray's logs sometime this month. January is the target month for W6MUR's Fanning QSL dissemination.

Europe — G3IDG provides interesting data on Britain's old-old-timer hams. Still going strong, Gs 4RK and 5PS were licensed in 1904, 4OT and 8OK in 1908, 2NV in 1909, 5RQ in 1910, 2DY 2SU and 3HT in 1911, 2BC 2CZ 2DX 2HQ 2KF 2NU 2VU 3RC 4VZ and GM4KU in 1912, Gs 2XV 4KI 5MM and 8NK in 1913, 2BH and 2NN in 1914. Also dating prior to WW-I are Gs 2CW 2HA 2LP 4WS 5SH 6DN and GM2HB. Calls in those days were three-letter affairs which included the letter "X". . . . . Activities of the "QRP Society" should appeal to W/VE/VOs who run under 20 watts. Write John Whitehead, "The Retreat," 92 Rydens Avenue, Walton-on-Thames, Surrey, England, for details . . . . . U. S. hams roving the Continent: W2HYL (DL4MK) took in the enjoyable International Hamfest at Munich in July, reporting the affair a huge success. . . . W3HXA visited Eire, receiving pleasurable hospitality at the hands of EIs 6G (Charlie McCarthy) and 5I. . . . W1ACC paid a visit to DL4 QSL manager DL4OR at Heidelberg in August and had the rare treat of working his Boston home station where W1LR threw the switches . . . . . WGDXC advices have the recent ZA1KAC pegged as okay . . . . . W1YYM learns that ZB1AUV formerly operated stations XABQ, I1RF, HA1RF and G3AUV.

South America — HC1FG and family spent their second summer in Atlantic City this year. W2LS notes that HC1FG was one of Ecuador's representatives to the 1947 A.C. Telecommunications Conference — Carlos really must have taken to the place . . . . . W7PSO is assured that CX2AM maintains a 100 per cent QSL policy . . . . . FY7YC tells W2BBK that he hopes to spend more time on the 14-Mc. airwaves. . . . . CX3AC notifies that somebody has been swiping his call; no legit-CX3AC QSOs since May, 1949.

Hereabouts — As noted by W1WPO, VE2WW is the first Quebec entry to score DXCC on 'phone . . . . . K6AM (ex-6OJ-W6QOJ) reports a veritable trial by fire upon plunking XE6AM on 20 c.w. during August. Clayton found the solution for excessive pile-ups to be: "Answer only calls at the other end of the band and be constantly on the move." Battling a straight key after nine years of electronic-keying was no help, either . . . . . YL W4UF looks forward to some African-style hamming by next summer — Dot *really* gets around . . . . . W9ESQ lately ticked off WAA CAA BERTA WBE WAVE WPR WCZ 50P-50W and DXCC diplomas . . . . . Ex-HH2OT, now a neighbor of WØIUB, awaits a new WØ call to replace the W4NL label he picked

(Continued on page 146)

DX CENTURY CLUB AWARDS

HONOR ROLL

W1FH	252	W6ENV	247	W6SN	242
W8HGW	251	G2PL	247	W2BXA	241
WØYXO	250	W6AM	246	W4BPD	241
W6VFR	249	W3GHD	244	G6RH	241
W3BES	248	W3JTC	242	G6ZO	241
		W3KT	242		

RADIOTELEPHONE

PY2CK	233	XE1AC	215	W1JCX	212
W1FH	224	W8HGW	214	W1NWO	212
VQ4ERR	222	W1MCW	213	W9RBI	210
Z86BW	216			8M5KP	207

From August 15 to September 15, 1954, DXCC certificates and endorsements based on postwar contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

NEW MEMBERS

W1KXU	111	VQ2DC	103	ZL1PO	101
DL7AQ	111	DL1IN	102	W1JEL	100
G3ESY	108	W2JKH	101	W1WPO	100
OH3NA	105	W7HYW	101	W2ZGB	100
DL7FW	104	DL3SW	101	W2QLH	100
DL7EN	103	DL6GB	101	F8PM	100

RADIOTELEPHONE

F8PQ	155	OD5AD	118	VE2WW	102
		DL3TM	102		

ENDORSEMENTS

W5KUC	220	8M5CO	180	DL3RK	130
WØELA	213	W9FJB	165	W3HER	123
GM3DHD	210	W5FXN	160	VE1EX	123
W5FFW	202	OH2QQ	156	W6ALQ	122
PY4IE	202	W1BGW	150	W9MQK	122
G4ZU	193	W9LI	149	WØDXE	122
W1ZL	191	F3MS	143	I1ALU	122
W3JTK	190	ZL1AH	140	W5UCQ	116
W6NTR	190	F8CW	137	W9TKV	113
W9GRV	180	W1VG	135	HB9IM	111

RADIOTELEPHONE

G4ZU	182	W3EVW	160	F8XP	130
W8GZ	180	PY4KL	152	F8CW	127
G3HLS	174	W3MAC	151	WØGKL	123
W4HA	173	PY4VX	150	W2FXE	115
		W5KUC	144		

CALL AREA LEADERS

W5MIS	239	W7AMX	236	VE4RO	221
		W9RBI	234		

RADIOTELEPHONE

W2APU	202	W5BGP	203	W7HIA	175
W3JNN	202	W6AM	196	WØAIW	162
W4EWY	172			VE3KF	163

DXCC NOTES

Announcement is hereby made of the addition to the ARRL Postwar Countries List of Navassa Island. This island is a United States possession located approximately 35 miles due west of Haiti, 80 miles due east northeast of Jamaica and 110 miles south of Caimanera, Cuba.

DXCC credit will be given starting January 1, 1955, for creditable confirmations dated on or after November 15, 1945. Confirmations received prior to January 1, 1955, for this country will be returned without credit.

In future ARRL DX Competitions, those making contact with amateur stations located on Navassa Island may claim credit for a separate country in line with DXCC rules.

The World Above 50 Mc.

CONDUCTED BY E. P. TILTON,* W1HDQ

IN compiling a column like this one, you soon learn that there are many hams who will not write letters. They'll spend any amount of time and money to talk with you by radio, and sometimes even by telephone. They'll open their hearts to you when you meet them in person. But as for taking pen in hand or typewriter in lap — well, they just can't be talked into it.

And it isn't that they don't have something to write about. Some of the most progressive and successful hams have incurable cases of writer's cramp. Thus it is that to have anything like a complete picture of what is going on in your particular branch of the art, you have to travel; far and wide, and fairly often.

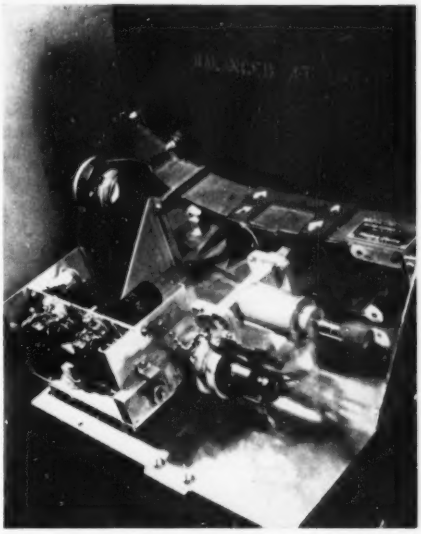
If your work includes the writing of a monthly summary of v.h.f. news, traveling is not always arranged easily. Monthly deadlines have a way of appearing all too often to allow much time away from what you hope will be an overflowing "incoming" basket. Your conductor has managed many short trips and a few long ones, but never before has it been possible to visit points much beyond a 1500-mile radius.

It is being done now, at long last, by making no pretense of preparing a full-scale monthly news report. Instead, we're passing along a few ideas that have come in from around the country recently. "The World Above 50 Mc." will look like "Hints and Kinks" this month, with maybe a smattering of news thrown in, if we can get it across the continent just before deadline. We'll have been operating /7, /6 and /5 by the time this appears in print, making a long jaunt through some 15 states west of the Mississippi. We hope you'll like the temporary change of format that made this long-awaited trip possible.

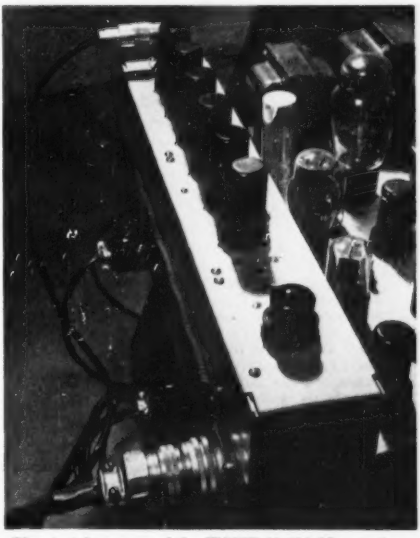
De Luxe Model 10,000-Mc. Gear at W7JIP

Last month we reported the extension of the 10,000-Mc. record from 47 to 109 miles by W7OKV/7 and W7JIP/7. The gear they used in their earlier work (see June *QST*) was something rather special as ham equipment for this frequency goes, but it was improved in several respects for the 109-mile try. The photographs at the right (courtesy W7PPQ) show some of the changes.

Antenna performance was improved by going to a 30-inch dish. Then a Cutler-feed dipole mounted on a waveguide stub of the correct focal length for the 30-inch reflector was installed. The back of the antenna mount is shown in the top photograph. The klystron is in the right fore-



Rear view of the antenna mount used by W7JIP/7 in working W7OKV/7 over a 109-mile path on 10,000 Mc. Mounted on waveguide are the 723A/B klystron and 3-cm. wavemeter. At the left is the i.f. preamplifier.



Plug-in i.f. system of the W7JIP 10,000-Mc. station.

*V.H.F. Editor, *QST*.

ground. Directly in back of it, mounted on the waveguide, is a new 3-cm. wavemeter with an accuracy of 0.1 per cent. At the left is a two-stage i.f. preamplifier, with cover removed.

The i.f. system was completely rebuilt as shown in the lower photograph. This is a plug-in unit, with finger stock on the bottom and rear side making the tight electrical contact that was necessary to prevent feed-back. The i.f. unit also contains an f.m. discriminator that doubles as an a.f.c. discriminator, and is equipped for either a.m. or f.m. detection. The control unit was also rebuilt, and it now contains the modulator, electronically regulated power supply for the i.f., a.f.c. and audio.

The end is not yet; several paths of 200 to 250 miles are now being investigated. Use of 2K39 klystrons is also being considered, to develop some 25 times the power of the 723A/Bs presently employed.

432-Mc. Converter Ideas — W5NSJ

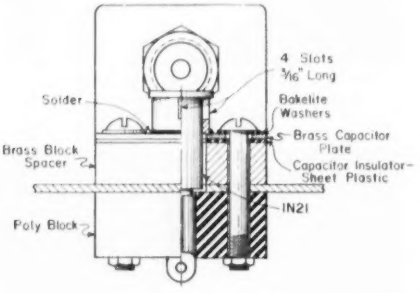
If you've built a 432-Mc. crystal-controlled converter and had trouble taming the r.f. stage, you'll be interested in the work of W5NSJ in this department. Ernie made his first converter along the lines of the one described in January *QST* and the current edition of the *Handbook*. He got it working fine, but found adjustment of the coupling between the r.f. stage and the mixer a tricky business. Even when it was adjusted so that the stage did not oscillate, the high Q of the mixer line caused its loading on the r.f. stage to vary across the band. Bandwidth of the system was about 1 Mc. at the low end, and 3 Mc. at the high.

Variations from the *Handbook* design included the use of two r.f. stages (making broader tuning even more desirable than with one stage), and an i.f. of 14 to 18 Mc., instead of 50 to 54 Mc. as in the original. The r.f. tubes were 6AN4s instead of 6AJ4s, but this probably had little to do with the case at hand.

Reasoning that the Q of the mixer circuit was probably not a great factor in the over-all performance, Ernie built another converter in which the crystal is coupled directly into the plate line of the second r.f. stage, as shown in Fig. 1. This arrangement not only eliminates tuning of the mixer stage entirely, but by reflecting a constant load on the r.f. amplifier all across the band it makes that stage tune less critically, also. The noise figure and apparent sensitivity are the same as the earlier model.

The cutaway view in Fig. 1 shows the method of mounting the crystal on the r.f. plate line. The base of the crystal mount is a block of brass $\frac{5}{16}$ inch thick, which serves as the grounded plate of a by-pass capacitor. It is drilled $\frac{5}{16}$ inch diameter at its center. The top plate is made of sheet brass or copper, to which is soldered a sleeve of brass tubing that takes the 1N21 crystal. The tubing from which this sleeve was made is $\frac{1}{4}$-inch i.d. $\frac{5}{16}$-inch o.d. stock available in hobby shops. It is slotted with a fine saw and then squeezed together slightly to make a tight fit on the large end of the crystal.

The small end of the crystal is fitted with a contact removed carefully from an octal socket. This is soldered to one end of the large coupling loop. Just above the mixer coupling loop is a smaller one for injection coupling, with its hot end brought to a phono-type coaxial fitting



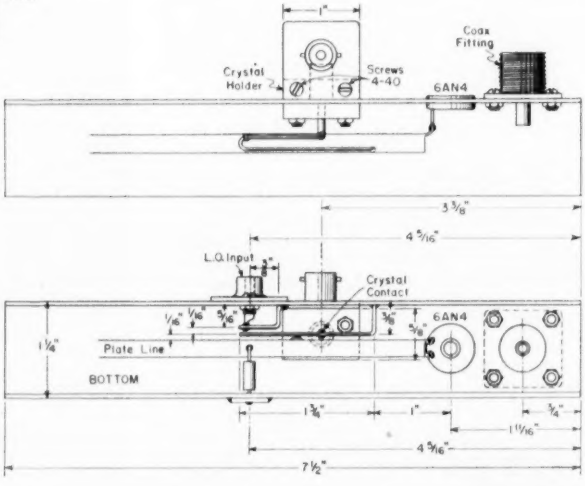


Fig. 1 — Details of the front end of W5NSJ's 432-Mc. converter. The crystal mount and its by-pass capacitor are shown in cutaway form above. The top view of the r.f. line, with the crystal mount on the top of the assembly, is shown at upper right. Interior view, lower right, shows the crystal-coupling and injection loops.

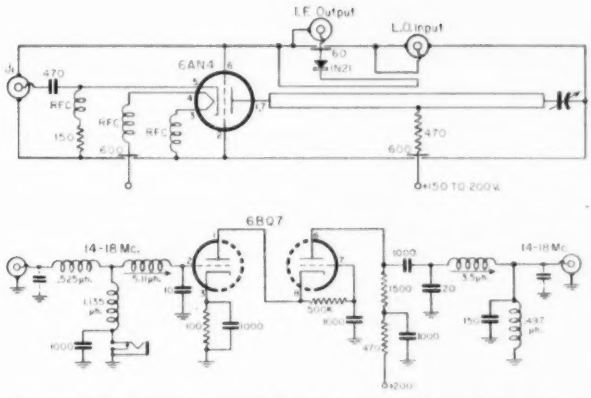


Fig. 2 — Schematic diagrams of the r.f.-mixer assembly and the broadband 14- to 18-Mc. i.f. preamplifier that follows it. Values are given in the text where they do not appear on the diagram.

mounted on the side wall of the r.f. line. Note that the injection coupling loop is smaller and more loosely coupled; tight coupling can drain off energy from the r.f. amplifier, preventing it from reaching the mixer and being converted to a useful signal. Set the coupling as loose as possible and still obtain around 0.8 ma. crystal current.

The top plate of the crystal mount is insulated from the bottom portion with plastic material taken from a "small parts" bag. The capacitance should be about 60 μμf. A block of polystyrene about the size of the brass plate is mounted inside the line. The contact for the end of the crystal is pressed into a hole in this block. It can be made tight by heating the contact so that it melts its way into the block. The hole should be a tight fit for the contact used, in this case.

With two r.f. stages preceding the mixer, tuning of the second stage is flat over at least 3 Mc. when injection and mixer coupling are at optimum. The first stage is flat over about 1 Mc. With the mixer arrangement described, the noise figure is equal to that of the first converter built, but adjustment for best results is considerably easier. The physical layout is simpler also, as the tuned line for the mixer is eliminated.

The intermediate frequency is 14 to 18 Mc., for tuning 432 to 436 Mc. The circuit diagram of the bandpass i.f. preamplifier stage is shown, with the r.f.-mixer schematic, in Fig. 2. Use of this frequency eliminates the need for a second converter ahead of nearly all communications receivers.

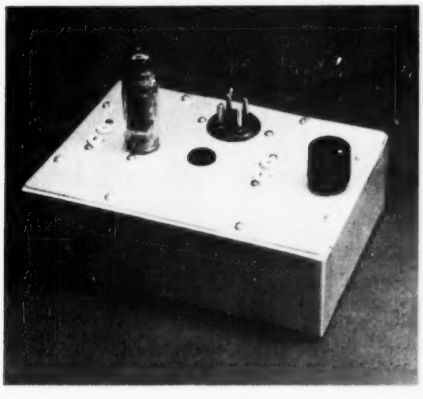
A Poor Man's Tripler for 432 Mc.

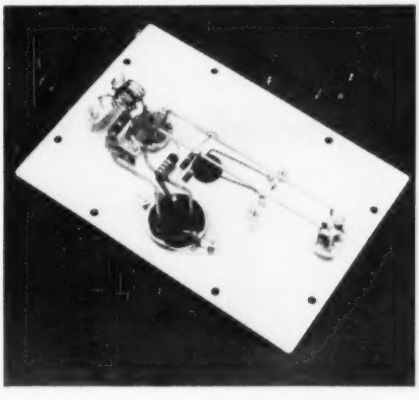
The new 6360 dual tetrode announced by Amperex some months ago has been getting quite a play on 144 and 220 Mc. It is somewhat like two 5763s in one envelope, and the manufacturer's data sheet states that it is good for full ratings up to 200 Mc. By stretching the point a bit, a number of 220-Mc. operators have made the tube work very well in the amateur 220-Mc. band, so the question of its capabilities on 420 follows logically enough.

The unit shown in the accompanying photograph was built in the ARRL lab by W1VLH, to answer the frequently-received inquiry. It is not the most efficient tripler to that frequency we've seen, but it does work, and it is probably the most inexpensive way yet for getting a couple of watts of r.f. on the third harmonic of your 2-meter frequency. The schematic is shown in Fig. 3 on the following page.

First catch your grid drive — and catch plenty, while you're at it. An output of 15 watts on 144 Mc. is not too much. We used the 2E26 exciter described in October *QST* and, soon, in the 1955 *Handbook*. It gave 2.5 to 3 ma. grid current through the 47,000-ohm grid leak, and it had to

Low-cost tripler to 432 Mc., for use with any 2-meter rig delivering 10 watts or more. Output is about 2 watts. Bottom view of the 6360 tripler is at right.





be that much. Cutting back on the drive cost output on 432 Mc. in a hurry.

The plate circuit is the half-wave type of line we nearly always use in 420-Mc. circuits. The grid circuit is self-resonant at 144 Mc. with only the tube capacitance across it. The turns of L_2 and the position of the coupling loop, L_1, should be adjusted for maximum grid current. The plate lines are soldered to the stator terminals of C_1, and then run parallel to the chassis, being bent over at right angles above the tube plate pins. Plate voltage is fed into the lines through 100-ohm resistors connected at the point of lowest r.f. voltage. This is 3 inches from the tuning condenser in the original. The output coupling loop of enameled wire is close to the plate lines on the under side.

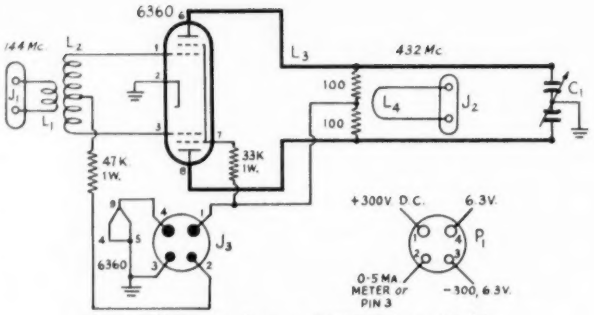


Fig. 3 — Schematic diagram of 6360 tripler to 432 Mc.

C_1 — 5-$\mu\mu$f. miniature butterfly (Johnson 5MB11).
L_1 — 3 turns No. 20 enamel, $\frac{3}{8}$-inch diam. Insert at center of L_2.
L_2 — 6 turns No. 16 tinned, $\frac{3}{8}$-inch diam. Spaced wire diam. with $\frac{1}{8}$ inch left in center for L_1.
L_3 — Made from two 4$\frac{1}{2}$-inch pieces No. 12 tinned with $\frac{1}{2}$ inch bent down at tube end. Spaced $\frac{1}{2}$ inch apart. Plate voltage fed in about 3 inches from C_1.
L_4 — Hairpin loop 1$\frac{1}{2}$ inches long and $\frac{1}{2}$ inch wide, made from 3$\frac{1}{2}$-inch piece of No. 16 enamel.
J_1, J_2 — Crystal socket (Millen 33102).
J_3 — 4-contact male chassis fitting (Amphenol 86-RCP4).
P_1 — 4-contact female cable connector (Amphenol 78-PF4).

Operating conditions are as follows: plate voltage — 300 max.; plate and screen current — 60 ma.; grid current — 2$\frac{1}{2}$ ma. (if more drive is available, increase grid resistor value to run same grid current); output — about 2 watts.

The disparity between the rated plate dissipation of 12 watts and the input-minus-output figure of 16 watts is accounted for by the screen current and by radiation losses. The tube runs satisfactorily at this input, and the stage will modulate upward if the drive is adequate and the loading moderate.

The Cheapest Antenna Elements

If you can't "afford" to put up a beam for 220 or 420 Mc., take the hint of K2BKU.

We dashed for the ARRL coat room upon receipt of his letter, and we found that there are two sizes of wire in general use for coat hangers. One is No. 12, a little floppy for anything longer than a 420-Mc. dipole. The larger de luxe model uses No. 10. This is at least as stiff as the aluminum clothesline often used for v.h.f. arrays. It would probably do for center-supported 144-Mc. elements, but you have to use the entire hanger, untwisting rather than cutting it.

2-METER STANDINGS

	Call	States	Areas	Miles
	W1HDQ	19	6	1020
	W1REU	18	7	1150
	W1IZY	16	6	750
	W1CCH	16	5	550
	W1AZK	14	5	650
	W1MNF	14	5	600
	W1BCN	14	5	580
	W1KCS	14	5	540
	W1DJK	13	5	520
	W1MMN	10	5	520
	W2ORI	23	8	1000
	W2UK	23	7	1075
	W2NLY	23	7	1050
	W2AZL	21	7	1050
	W2QED	20	7	1020
	W2OPQ	19	6	
	W2PAU	16	6	740
	W2BLV	16	5	700
	W2UTH	15	7	880
	W2DFV	15	5	—
	W2AMJ	14	5	550
	W2AOC	14	5	450
	W2QNZ	14	5	400
	W2DWJ	14	5	425
	W2SFK	13	6	—
	W2CET	13	5	405
	W3RUE	23	8	950
	W3NKM	19	7	660
	W3KWL	16	7	720
	W3LNA	16	7	720
	W3FPH	16	7	—
	W3IBH	16	5	570
	W3GKP	15	6	800
	W3TDF	13	5	570
	W4HHK	26	8	1020
	W4AO	22	7	950
	W4PCT	20	8	—
	W4JFV	18	7	830
	W4MKJ	16	7	665
	W4UMF	15	6	600
	W4OXC	14	7	500
	W4JHC	14	5	720
	W4TCR	14	5	720
	W4UBY	14	5	435
	W4IKZ	13	5	720
	W4JFU	13	5	720
	W4ZBU	10	5	800
	W4UDQ	10	5	850
	W4WCB	9	4	650
	W4TLA	7	4	850
	W5RCI	21	7	925
	W5JTI	14	5	670
	W5QNL	10	5	1400
	W5CVW	10	5	1180
	W5AJG	10	4	1260
	W5MWW	9	4	570
	W5ML	9	3	700
	W5ABN	9	3	780
	W5ERD	8	3	570
	W5VX	7	4	—
	W5VY	7	3	1200
	W5FEK	7	2	580
	W5ONS	7	2	950
	W6ZL	3	3	1400
	W6PJA	3	3	1390
	W6WSQ	3	3	1390
	W6BAZ	3	2	320
	W6NLZ	3	2	247
	W6MMU	2	2	240
	W6GCG	2	2	210
	W6QAC	2	2	200
	W6EXH	2	2	193
	W7VMP	4	3	417
	W7JU	3	2	247
	W7LEE	3	2	240
	W7YZU	3	2	240
	W7JUO	2	2	140
	W7RAP	2	1	165
	W8BFQ	28	8	775
	W8WXV	27	8	1000
	W8WJC	25	8	775
	W8KMH	20	8	690
	W8WRN	20	8	670
	W8DX	20	7	675
	W8BAX	19	7	655
	W8EP	18	7	800
	W8UKS	18	7	720
	W8RWW	17	7	630
	W8WSE	16	7	830
	W8SRW	16	7	700
	W9EHX	23	7	725
	W9FVJ	22	8	850
	W9EQC	21	8	820
	W9IPV	20	7	1000
	W9UCH	20	7	750
	W9KLR	20	7	690
	W9LF	19	—	
	W9ALU	18	7	800
	W9KPS	17	7	530
	W9WOK	17	6	690
	W9ZHL	17	6	—
	W9MBI	16	7	660
	W9BOV	15	6	—
	W9LEE	14	6	780
	W9DDG	14	6	700
	W9FAN	14	7	680
	W9QKM	14	6	620
	W9DSP	14	5	700
	W9UIA	12	7	540
	W9ZAD	11	5	700
	W9GTA	11	5	540
	W9JBF	10	5	760
	W0EMS	25	8	1175
	W0GUD	22	7	1065
	W0IHD	20	7	725
	W0ONQ	17	6	1090
	W0INI	14	6	830
	W0OAC	14	5	725
	W0ZJB	12	7	1097
	W0WGZ	11	5	760
	VE3AIB	20	8	890
	VE3DIR	17	7	790
	VE3BQN	14	7	790
	VE3DER	13	7	800
	VE3BPB	12	6	715
	VE3AQG	11	7	800
	VE1QY	11	4	900
	VE2AOK	10	5	550

Off to the RACES

Hints and Kinks on Getting Your RACES System into Operation

BY A. A. GARN,* W8HNP

In some locations little or no thought has been given to civil defense communications. In a lot more, the c.d. people seem to feel that the telephone system will provide adequate communications. Although few will contest the value of good wire communications, radio nets will have to carry much of the communications load when the chips are down. One of our first jobs, and often biggest, is to convince the local c.d. director that radio will be necessary. The Radio Amateur Civil Emergency Service is one means of providing c.d. with radio communications. How, therefore, should you proceed in getting RACES started?

First, your local Emergency Coördinator should select two or three outstanding amateurs to form a committee to sell the c.d. director on the necessity for setting up a RACES organization. The committee members should be well known and respected in the community, for they may have a tough selling job ahead.

The Radio Planning Committees

The next step is to establish a communications committee to consider all phases of communications. The EC or his representative should be a member of this committee and it should have a subcommittee called the "Radio Planning Committee." The personnel of the RPC should include the original committee mentioned above, plus several amateurs noted for their technical ability. Amateurs who can take the broad over-all viewpoint are a must. Be sure to include on your Radio Planning Committee amateurs from every city, town, zone, or what have you, to be embraced by the RACES plan.

Analysis of present radio facilities and their availability to c.d. communications are among the first duties of the RPC. What systems, other than amateur, are in the area you will cover? What frequencies are used? How many base stations and their locations; how many mobiles? What area does each system cover? Would these systems be able to provide any help in a c.d. disaster?

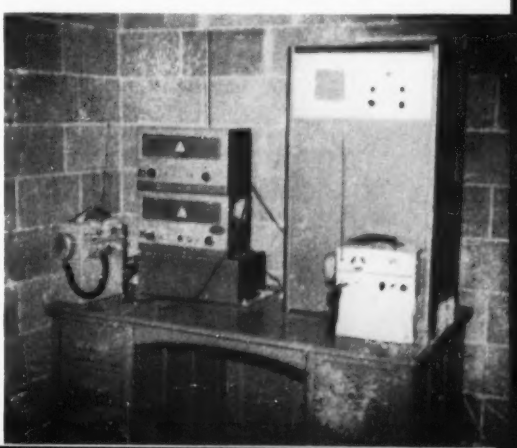
A survey of operative mobile and fixed amateur stations by frequency bands should then be made. A survey in our area indicated that we had no 6-meter mobiles and only a few 2-meter mobiles. The 160- and 80-meter bands were not considered practical for mobiles from a RACES standpoint. We did have quite a few 10-meter mobiles. While recognizing the limitations of the 10-meter band, we felt it most important to get at least some sort of a RACES net going to take care of possible immediate eventualities. Our planning has been completed to establish a 6-meter net as well as a Disaster Communication Service net which will be mentioned later. Included in our original RACES plan are several 2-meter nets using c.d.-owned equipment. Generally speaking, all fixed equipment for our nets has been provided by c.d.; the mobiles, except on 2 meters, by the amateurs.

A Radio Officer should be appointed at about the same time the RPC is formed. The RO is generally the Emergency Coördinator. Most of the success in bringing a RACES organization to the point of getting an FCC license rests with this official.

Once the Radio Planning Committee has completed the facilities survey you are in a position to start preparation of your communications plan. Sections 12.200 to 12.257 of the RACES rules contain the FCC requirements for your RACES Communications Plan. Your RACES group must provide radio communications to *all* segments of civil defense requiring same, not just for one c.d. service only.

The Radio Officer should sit down with the c.d. Director and the directors of the various c.d. services and find out what radio communications

* Deputy Director for Communications, Office of Civil Defense, County of Lucas and City of Toledo, 3944 Grantley Rd., Toledo 13, Ohio.



A typical zone control in the Toledo area, showing part of the radio installation. A complete set of antennas is permanently installed at each zone control.

they will need — note that we say *need*, not like to have — and get an estimate of the amount of traffic to be handled and how many nets you will need. Then you can start locating fixed stations, deciding mobile coverage points, etc.

Toledo and Lucas County are divided into five zones (see Fig. 1) with a zone control in each. The zones are established by the c.d. officials but the physical location and arrangement of main and zone control points generally are not important to other than the communications services. Therefore, these control points can be located most favorable from a communications standpoint, provided they are out of any probable heavy blast damage area.

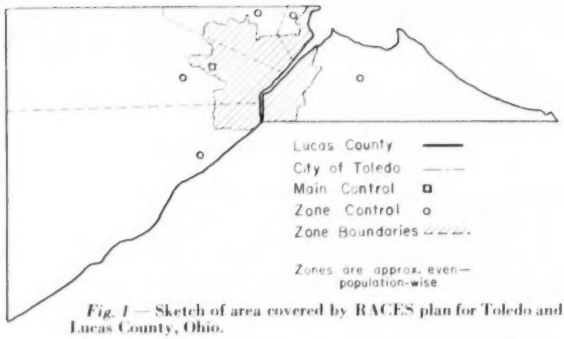


Fig. 1 — Sketch of area covered by RACES plan for Toledo and Lucas County, Ohio.

The RACES Plan

Your plan should begin with a statement as to what area it covers, give the names of the various c.d. Directors in your area, and state how they will coöperate in communication matters.

Part I

Part One of your plan is to cover the following for the benefit of the FCDA.

1) *Security* — what are the procedures and sources for checking the loyalty of RACES personnel and the Radio Officer and his alternates?
2) *Utilization of facilities* —
   a) How will facilities be used for command and operational purposes?
   b) How will facilities be used for liaison and coördination purposes, especially with mutual aid and mobile support groups? How will you coöperate in sharing frequencies with other near-by areas? Use maps, charts and refer to your state plan.
3) Give statements as to use of tactical call signs, codes and ciphers.

Part II

Part Two of your plan should cover the following for the benefit of the FCC. There may be some duplication of information already given in Part One, but this information must be shown again.

1) Area covered by plan.
2) Names and addresses of civil defense Directors responsible for coördination of all c.d. activities in area covered.
3) Names and addresses of civil defense Radio Officer and his alternates. Attach FCC Form 482 for each.
   a) Plan for operation and purpose of each of the nets in connection with your proposed plan. We suggest that drawings, maps, etc., showing the various zones, main control location, and zone control locations be attached to the plan.
   b) Call signs to be used by each net. Attach copy FCC Form 481 applying for authorization to use each call.
   NOTE: You may desire to set up your call and unit numbers in this manner: The units at Zone 1 control use numbers 10 to 19. Zone 1 units operating away from zone control use numbers in the 100 series. In Zone 2 use numbers 20 to 29 and in the 200 series, etc. If you have a "Command" net with a unit at main and at each zone control, then the unit numbers could be 2 at main, 12 at Zone 1 control, 22 at Zone 2 control, etc. Other similar schemes of systematic unit numbering will suggest themselves.
   c) Statement as to estimated ultimate number of units in each band.
4) Statement as to present status of main and zone control radio installations.
5) How will RACES frequency sharing problems be resolved with other areas?
6) Security statement — you can repeat information on security given in Part I.
7) The Plan should be signed by the Radio Officer. The following successive approvals and signatures are required:
   a) All civil defense Directors in area covered by the plan.
   b) State civil defense Director.
   c) Regional FCDA Director.
   d) FCDA — national.
   e) Federal Communications Commission.

Be sure to include sufficient copies for your state officials plus one each for Regional FCDA, FCDA, National and FCC.

Recruiting

Our experience indicates that little recruiting should be done until the RACES plan is approved or until equipment has been installed at main and zone controls. You can stir up enthusiasm early but unless there is something to work with and drills held, apathy will set in and your RACES enrollees will lose interest. The Radio Officer

should pick from 3 to 5 outstanding amateurs in each zone and appoint them as zone radio officers. He should also appoint an equal number to be assistant radio officers at main control. These radio officers need not be approved on FCC Form 481. The main-control assistant ROs should recruit a sufficient number of amateurs in the area near main control to assist at main. The zone ROs should then recruit assistance at zone control and zone mobile units.

Under the FCC rules, nonamateur personnel with Restricted Radio telephone licenses may operate equipment in RACES, provided they do not make adjustments on it. This provision makes available to RACES a large group of people who can be quickly and easily qualified as operators. One of your alternate radio officers can be put in charge of training people for this purpose.

Recruiting of amateurs or others should be restricted to cool, levelheaded, capable people, both men and women, whose loyalty is beyond question. Your AREC is a choice preselected group of candidates.

It would be well to have an enrollment form for RACES applicants, with space for telephone numbers, date and place of birth, equipment available, emergency power if any, class of license, hours available, etc., along with the standard c.d. loyalty oath which is mandatory.

The AREC membership is a fertile source of RACES personnel since they have had experience in the sort of activity for which they are now needed. The AREC is the foundation on which we build RACES and without which RACES could not be quickly and efficiently brought into being.

Some sort of activity at least once a month is a must. These can be combined RACES-AREC activities because the personnel will inevitably be about the same in both.

Frequencies and Operations

In our set-up, the 10-meter RACES segment is divided into six frequencies. One is used to contact zone controls from main. Each of the five zones has its own frequency and is monitored by main. We also have a unique system of 10-meter fixed stations in each zone. These stations are given signs to attach to the front of their locations in private homes. Each attractive-looking sign, about 12" by 18", in red, white and blue, reads "Civil Defense Radio Reporting Center Number —. For Disaster Only." The signs are given to amateurs enrolled in RACES who do not have mobile units and are not needed at control points. The amateurs must provide emergency power so they can contact zone control if the regular a.c. power is off. A list of these stations is in the hands of wardens and other c.d. people so they know that they can communicate with control from these points if telephones are out.

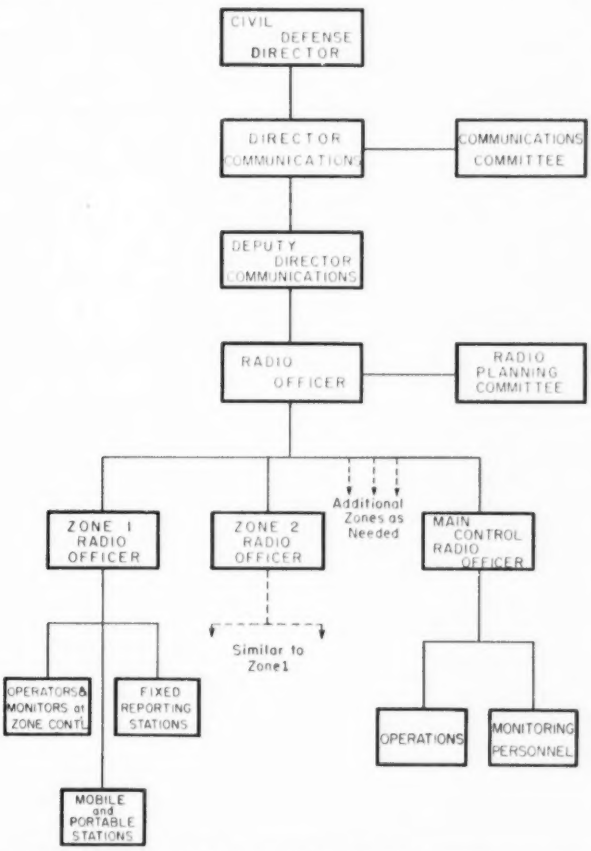


Fig. 2 — Block diagram of a typical Civil Defense communications organization.

Note that our 10-meter mobiles are on five different frequencies, one for each zone. Experience has taught us that the confusion and delays under a one-frequency system outweigh any advantages. If a mobile is caught out of his zone during a disaster and has no VFO, he simply goes to the nearest zone control point and gets a crystal on that zone's frequency.

An effective coordinating net can be organized by installing at main control a 2-meter transmitter. Provide

monitoring receivers for same at the control points of all cooperating services such as police, fire departments, sheriff, utilities, telephone company, etc. At main control have receivers monitoring each of these services. Provide a receiver at each zone control to monitor the coordinating transmitter. Thus each zone will know what is going on and can receive "all-points bulletins" without tying up one of the other nets.

An additional net on 2 meters with 2-way equipments at main and each zone control, all on the same frequency, can provide a section net which may be used for information-gathering purposes. We have a mobile 2-way unit and two hand-carried units stored at zone control points, operating on this same frequency. Proper procedure prevents interference and confusion with the relatively small number of units involved. Should disaster strike, a car is commandeered, the mobile unit installed in it, and two hand-carried units are also put in. The assigned radio men and c.d. people go along in this or additional cars. The battery-operated mobile units are designed for fast installation. A small 2-meter antenna mounted on an insulator on a battery clip can be fastened to the eaves of the car, making total installation time only a few minutes, and works very successfully.

The mobile with its two hand-carried units is to be sent in toward the blast area as far as possible. When debris or traffic congestion prevents further progress, the two hand-carried units leave the mobile and proceed separately into the disaster area. They gather information as to fires, road blocks, radiation levels, etc., and radio it to the mobile who in turn passes it to zone control. The c.d. officials at zone then can decide how to commit their forces and can keep main apprised of the situation.

The main function of the 10-meter nets (and of the 6-meter net-to-be) is to get information from zone control and deliver it to engineering rendezvous, transportation assembly points, medical field hospitals and the like. Mobiles may be stationed at some of these points or cover several on a set schedule of rounds.

All of the above nets and functions must be described in your RACES communication plan. Sketches or diagrams similar to Figs. 1 and 2 can be attached to explain your operations further.

Disaster Communications Service

Integration of the Disaster Communications Service (see FCC rules, Part 20) into your overall communications plan is worth considering. The DCS is not a RACES system or an amateur service; however, licensed amateurs may operate in the DCS if they be granted permission by the licensee of the DCS net. The frequency band is 1750-1800 kc., a part of our old 160-meter band. In our area there are more 160-meter amateur mobiles than on any other frequency. In order to use them, we have applied for and received a DCS station license. Our RACES Radio Officer is the licensee of the system. We feel that we thus have control of all possible disaster channels under one authority and accordingly there will be no competition for amateurs among the various groups.

Training and Personnel

Following receipt of your RACES authorization, training should be started. The proper message form and handling thereof should be worked out with the c.d. officials. Test drills should be arranged. Perhaps the biggest task of all will be to prepare a Standard Operating Procedure in coordination with the c.d. Communications Officer. The SOP puts in writing every step in the preparation and handling of messages. Your experience on ARRL traffic nets and in message handling will be invaluable here. Finally will be the everlasting job of the RO and his assistants in keeping up interest and participation.

Should your area be so fortunately situated that there are no probable target cities in adjacent counties, you will find that amateurs in them will be glad to enroll in your RACES system and come into your area and help when needed. Many additional enrollees can be picked up this way, but remember they cannot use your RACES call(s) except when in your area.

In this article we have tried to make your RACES way easier. A few points to remember:

1) The Civil Defense Director and all c.d. officials must be sold on amateur radio participation through RACES.

2) The selection of a Radio Officer is most important.

3) Use good judgment in selecting those you enroll in RACES.

4) Keep your RACES plan brief, but complete. Too much detail confuses. Our 5-page plan received quick approval.

5) Remember that RACES is only a part, even though a vital one, of civil defense communications.

Your amateur group can operate in such a way that they, as we, can receive such compliments as: "Performed exactly as requested," and, "The amateur radio people were the only ones who seemed to know what they were doing."

Strays

When fiction writer Murray Hoyt visited a colleague in Worcester, Mass., he became intrigued with the amateur radio activities of young Judy Gage, W1YCU, age sixteen (pic p. 48, June *QST*). You guessed it: A short story with a ham theme resulted, and is scheduled for the November 20th issue of *The Saturday Evening Post*, titled "Lovely Neighbor."

U. S. N. R.

Winner of the Hooper Trophy for excellence in Naval Reserve electronics training during fiscal year 1954 will be announced as soon as final scores are verified. Approximately 125 Naval Reserve electronics divisions participated

The Hooper Trophy, to be awarded to the outstanding Naval Reserve electronics division, was named in honor of Rear Adm. Stanford C. Hooper, USN (Ret.), in recognition of his efforts to encourage and promote electronics in the Navy.

in the first nation-wide competition for the trophy. Within naval districts, the following Naval Reserve electronics divisions won:

First Naval District, NRED 1-1, Malden, Mass., commanded by Lt. W. J. Hardiman. *Third Naval District*, NRED 3-4, Earle, N. J., commanded by Lt. Cmdr. W. H. Grove. *Fourth Naval District*, NRED 4-2, Curwensville, Penna., commanded by Lt. Cmdr. H. T. Lasher. *Fifth Naval District*, NRED 5-2, Charlottesville, Va., commanded by Lt. Cmdr. J. H. Michael, jr. *Sixth Naval District*, NRED 6-9, Winter Haven, Fla., commanded by Lt. Cmdr. Gordon MacCalla. *Eighth Naval District*, NRED 8-12, Paris, Texas, commanded by Cmdr. Paul H. Daniels. *Ninth Naval District*, NRED 9-18, Eau Claire, Wis., commanded by Lt. J. Lucente. *Eleventh Naval District*, NRED 11-2, Santa Maria, Calif., commanded by Lt. Cmdr. R. M. Clare. *Twelfth Naval District*, NRED 12-6, Santa Rosa, Calif., commanded by Lt. Cmdr. A. R. Butz. *Thirteenth Naval District*, NRED 13-13, Olympia, Wash., commanded by Cmdr. William S. Rummens. *Fourteenth Naval District*, NRED 14-1, Hilo, T. H., commanded by Lt. Cmdr. James H. Case.

Flood Teams

Naval Reservists and amateur radio operators teamed up to assist in emergency operations against floods in Edinburg, Texas, and Des Moines, Iowa.

When floods struck in Edinburg, Dr. C. H. Miller, director of the Hidalgo County Public Health Service, requested that the South Texas Emergency Net (STEN) set up communications in isolated areas in order to establish typhoid innoculation stations.

Naval Reserve Electronics Division 8-24 operated a portable station in the office of the Public Health Service. Mobile stations, manned by both Reservists and amateur radio operators, were set up at various innoculation centers.

Naval Reserve Electronics Facility, Harlingen, Texas, established a portable station in the community of Elsa, which had been cut off from highway communication by the high waters during the 12-day emergency.

When the levee was threatened by high water in Des Moines, the Naval Reserve personnel used equipment from the Naval Reserve Training Center and worked with the local amateur radio club to relay information to Flood Control.

The Reservists took stations on the levee, manning four SCR-300s. As weaknesses and leaks in the levee were spotted, Reservists would contact radio cars which would send reports to the amateur radio station at police headquarters for relay to Flood Control. Thus, sand trucks and Flood Control crews were able to move rapidly from point to point.

Reservists from Surface Divisions 9-54, 9-55 and 9-56 stood guard along the levee for four days before the water subsided.

Here and There

Equipped with hand-carried portable radios, four men of the Naval Reserve Training Center at Bellingham, Washington, aided in the recent rescue of two elderly prospectors lost in the treacherous and rugged country of northern Washington.

The men joined two search groups and endured five days with only a few hours sleep before finding James Booth and Joe King, both 70. Since Mr. King was too weak to walk, a portable set was used to request a helicopter.

Volunteering to join the search were Phillip Seldomridge, FPC, USNR; James Hickok, AC2, USN; John Coulthurst, HN, USNR; and Sgt. James Stobe, USMC.

—•••—

The Quonset Point Amateur Radio Club (WITNH), located at the Naval Air Station, Quonset Point, R. I., is being reactivated after a year's silence. Six licensed amateurs, with more than 100 years' transmitting experience among them, will help form the nucleus of the club. The organization is open to both military personnel and civilian employees at the air station.

—•••—

Naval Reserve Electronics Division 13-13 at Olympia, Washington — organized just one year ago — was awarded the Navy "E" pennant for being the first such division to attain full complement in the state. The pennant was received simultaneously with the announcement that Olympia had the highest competitive score of electronics divisions in the Thirteenth Naval District for fiscal year 1954.

WWV-WWVH SCHEDULES

For the benefit of amateurs and other interested groups, the National Bureau of Standards maintains a service of technical radio broadcasts over WWV, Beltsville, Md., and WWVH, Maui, Territory of Hawaii.

The services from WWV include (1) standard radio frequencies of 2.5, 5, 10, 15, 20 and 25 Mc., (2) time announcements at 5-minute intervals by voice and International Morse code, (3) standard time intervals of 1 second, and 1, 4 and 5 minutes, (4) standard audio frequencies of 440 cycles (the standard musical pitch A above middle C) and 600 cycles, (5) radio propagation disturbance warnings by International Morse code consisting of the letters W, U or N, together with digits from 1 through 9, indicating present North Atlantic path conditions and conditions to be anticipated. (See ARRL *Handbook* for details on interpretation of forecast symbols.)

The audio frequencies are interrupted at precisely one minute before the hour and are resumed precisely on the hour and each five minutes thereafter. Code announcements are in GCT using the 24-hour system beginning with 0000 at midnight; voice announcements are in EST. The audio frequencies are transmitted alternately: The 600-cycle tone starts precisely on the hour and every 10 minutes thereafter, continuing for 4 minutes; the 440-cycle tone starts precisely five minutes after the hour and every 10 minutes thereafter, continuing for 4 minutes. Each carrier is modulated by a seconds pulse, heard as a faint clock-like tick; the pulse at the beginning of the last second of each minute is omitted.

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
R. L. WHITE, W1WPO, Asst. Comm. Mgr., C.W.
PHIL SIMMONS, W1ZDP, Communications Asst.

GEORGE HART, W1NJM, Natl. Emerg. Coördinator
ELLEN WHITE, W1YYM, Asst. Comm. Mgr., 'Phone
LILLIAN M. SALTER, W1ZJE, Administrative Aide

WITH November here, the vacation season is long past and the time of best amateur operating of the year is at hand. A successful Simulated Emergency Test was reported from many points. Both 'phone and c.w. netters report a general resumption of skeds, following numerous dinners and planning-meetings to further their organizations, and to appoint liaison stations for traffic flow between nets to insure greater coverage. Hurricanes Carol and Edna brought heavy wind and water damage, and two months of normal rainfall in one day; forty cities had communications knocked out. Many AREC and RACES nets were on the job; we hope to report which ones next month.

All the letters inspire us with the feeling that we have a strong and good ARRL. If pressed to say what makes it so we would cite that there is flourishing Section activity, traffic coördinated through a National Traffic System, a valuable emergency and civil defense set-up provided through AREC and RACES, and clubs are training and examining their newer hams and members on a broad scale. Our ARRL is a highly respected institution by virtue of the fact that each of our groups contributes to a definite pattern having a *constructive purpose* and does not exist merely to amuse the members.

In pressing on toward worth-while objectives, some fall house cleaning may be called for. The old rig may need an overhaul. Also, some of our individual prejudices against "other" group interests in amateur work may need to be put away. *All* we do in *all* our bands is actually of some importance to *each* of us. Unity and understanding is required to make the most of every amateur privilege and maintain same. Only full co-operation between our groups will find which amateurs have more than one band or net interest, and who consequently are best equipped for complete liaison and net appointment as the representatives to swap traffic and other communications between 'phone-c.w.-v.h.f.-s.s.b.-RTTY groups, for example. Incidentally, it seems the two latter groups *both* may register nets in our annual ARRL Net Directory for the first time. To the degree that *all* amateurs will dedicate *some* of their time to developing practical communications beyond just the pleasure of rag chewing, we can have a nation-wide radio facility to take in every town and city where there is as much as one single ham!

A more universal identity of all of us with AREC and/or RACES is important. Only such can truly allow each of us to reflect the Amateur Service pride in spelling out what amateur radio means to the nation in ever bigger letters. (Some may prefer to continue to shine by reflected glory.) ARRL becomes, through operating means and coördination of all radio efforts, truly Of, By, and For the Amateur. Fall activities include our invitation to participation through Official Appointment; see details on whom to write, page 6. Amateur radio can benefit and you will only enjoy and benefit in strengthened service and communications, for all as you take part. So accept every challenge and operating opportunity that comes along, as you can, this season!

Novice Crystal Bank. The Dayton Amateur Radio Assn. (Ohio) reports in its *R.F. Carrier* that it is among the first clubs to be granted permission to conduct examinations for Novices and Technicians on a group basis. Classes started September 28th and will end with FCC exams November 30th. This club has another idea active clubs may want to copy. A Novice "crystal bank" is maintained by W8OVG. Any local Novice licensee can borrow a crystal or two with the understanding that he must give it back or replace it when he gets his General Class or when his WN-license runs out. The Aeronautical Center Amateur Radio Club (Okla.) likewise just purchased several crystals in the 3.7- and 7.175-Mc. region for its Novice crystal bank. It is a good way to dispose of seldom-used crystals, to give new hams a helping hand and club members another local service.

21st Annual ARRL Sweepstakes! This operating activity is open to every active W/VE operator, the name betokening a "clean sweep" of radio contacts across the nation. The broom token of a clean sweep was first tied to ship mastheads by Dutch skippers and was used by ARRL in announcing our first Sweepstakes in 1929. Logs were up 42 per cent last year over the year before, and the "SS" seems to grow in popularity with each passing year. Here is a chance to operate your own station for a "clean sweep."

Contestants swap exchanges similar to message preambles with amateurs in as many of the 73 ARRL sections as possible. A large percentage of the entries are in the power class of those running 100 watts input or less. A maximum of 40 hours of operating time is permissible. A power multiplier helps this power class compete with the kilowatts. Clubs go out for a gavel award for the aggregate score of their participating member-stations. Separate section certificates

for top Novice results are given where a section has three or more WN entries. You WNs should send radiograms or cards for our free SS log sheets, and be sure to submit to ARRL your log lists of SS stations worked for official credit. This is so your section will have at least *three* logs and one WN can get the winner's certificate. The leading WN last year had 127 contacts in 30 different ARRL sections — so this also is a way to speed along those cards for WAS.

All amateurs are invited to give their station the "SS" operating test to see what it can do. The SS is good fun and a chance to build up operating know-how at the same time. See the full rules and announcement elsewhere in this issue. Hope to see you in the "SS"!

— *F. E. H.*

CODE-PRACTICE STATIONS

An outstanding example of code-practice stations and the friendly helpful service they afford is W9UIN, Joe Kadlec of Evanston, Illinois. Joe needs little introduction to the many hams and prospective hams who closely follow his listed schedule, but background information *is* in order.

Licensed since 1935, W9UIN's old stand-by rig (47 xtal, 46 doubler and 210 final) served for many years on 40. A 200-watt rig with a Taylor 822 followed, and came the war. Service with the Counterintelligence Corps in World War II, Europe with the 4th Infantry Division, France on

D-Day and participation in the Battle of the Bulge was the Kadlec agenda in the years that followed. After V-J Day came an 813 with a few attempts at screen modulation and now the current rig, a conservative 400 watts (BC-459 driving half of a 304TL) with 211 modulators.

The present W9UIN schedule (listed below) will continue through the end of the year. The second series of this season's lessons will begin January 2, 1955, and end about March 29th; followed by the last series, April 2nd to June 26th. For more advanced speed practice, Joe invites you to listen to his Official Bulletin schedule (15 w.p.m.) Monday through Friday, 7110 kc., at 2200 CST.

— • • • —

The following is an up-to-date list of all stations currently transmitting code practice in the ARRL Code-Practice Program:

W1ACT, Fall River ARC, 57 Richmond St., Fall River, Mass.; 3545 kc.; Mon., Wed., Thurs. and Fri., 1900 EST; 5–7 w.p.m.

W1QZO, Harry Warner, 11 Berlin St., Wollaston, Mass.; 146.8 Mc.; Tues. through Sun., 1900 EST; 6–14 w.p.m.

W1SRB, Al Vesce, 84 N. Main St., Thompsonville, Conn.; 29.6 Mc.; Mon., Wed. and Fri., 1930 EST; beginners' speeds.

W2EZS, Paul Reynolds, 63 Oswego St., Baldwinsville, N. Y.; 3698 kc.; Mon. through Fri., 1800 EST, slow speeds.

W2HEI, William Teso, Mountain Ave., Hillburn, N. Y.; 3950 kc.; Sat. and Sun., 1400 EST; 5–18 w.p.m.

K2IBC, Avenel Radio Club by W2FSL, Adolph F. Elster, 53 Commercial Ave., Avenel, N. J.; 3675 kc.; Sat., Sun. and holidays, 0730 EST; beginners' speeds.

W2NRM, Howard B. Jack, Brown's Trailer Court, R.F.D. 6, Lodi, N. J.; 29.118 and 145.188 Mc.; Mon. through Sun., 0800 EST; Mon., Tues. and Fri. 2200 EST; Wed., 1915 EST, 3–8–15 w.p.m.

W3UVD, Walter C. Downes, R.D. 2, Box 328, Jeannette, Penna.; 3585 kc.; Sun. 0930 EST, Wed. 1830; 5–15 w.p.m.

W4RUR, for St. Petersburg Amateur Radio Club, E. J. Blatt, 538 16th Ave. So., St. Petersburg, Fla.; 28.05 Mc.; Mon. and Wed., 1900 EST; 6–22 w.p.m.

W5JRV, for Galveston County Amateur Radio Club, Blanchard Boldman, 4802 Ave. Q½, Galveston, Tex.; 1882 kc.; Mon. and Fri., 1900 CST; 3–15 w.p.m.

W5USN, Dan Baird, W5SPZ, Chief in Charge, 8th Hdqtrs. USNR Radio Station, Marconi Drive and Robert E. Lee Blvd., Route 3, New Orleans 24, La.; 7100 kc.; Mon. through Fri., 1230 CST; 15 w.p.m.; 7100 and 3750 kc.; Fri. through Mon., 1930 CST; 15 w.p.m.

W6JZ, Ray Cornell, 909 Curtis St., Albany 6, Calif.; 3590 kc.; Mon., Wed. and Fri., 1830 PST, 5–25 w.p.m., 1920 PST, 35–45 w.p.m. (When needed, schedule maintained by W6EFD.)

K6USN, Cmdr. J. M. McCoy, 12th Naval District Reserve Electronics Stn., Bldg. 7, Treasure Island, San Francisco, Calif.; 3590 kc.; Tues. and Thurs., 1830 PST; 5–25 w.p.m.

K7FCV, Lyle B. Clemans, CWO USAF, MARS Base Dir., Davis-Monthan AFB, Tucson, Ariz.; 3825 kc.; Tues., 1830 MST; 8–20 w.p.m.

W7FWD, O. U. Tatro, 513 N. Central, Olympia, Wash.; 3646 kc.; Mon. through Fri., 1700 PST; 4–25 w.p.m.

W8MAI, Blossomland Amateur Radio Assn., c/o W8FGB, Dean Manley, R.F.D. 1, Box 147F, St. Joseph, Mich.; 1890 kc.; Mon. through Fri., 2000 EST; 5–20 w.p.m.

W9NPC, for Fox River Radio League, Lewis R. Hill, 212 N. Evanslawn Ave., Aurora, Ill.; 1810 kc.; Mon. through Sat., 1900 CST; 5–20 w.p.m.

W9UIN, Joseph H. Kadlec, 1148 Ashland Ave., Evanston, Ill.; 7150 kc., Sat. and Sun., 0800 CST; 5–7½ w.p.m.

WØEGQ, Bob McMullin, Route 1, Lehigh, Nebr., 3755 kc.; Mon. through Sun., 1800 CST; 5–13 w.p.m. with text from *The Braille Technical Press*. Same schedule alternated with WØLGG, Bertha V. Willits, 108 N. 19th St., Marshalltown, Iowa, with text from *QST*.

WØLQC, F. Bion McCurry, 1234 Stanford, Springfield, Mo.; 29.18 Mc.; Tues., 2130 CST; beginners' speeds.

WØQDF, W. H. DuBord, 10247 Midland, Overland, Mo., 29.6 Mc.; Mon. and Wed., 2000 CST; Mon. 5–13 w.p.m., Wed. beginners' speeds.

WØSQE, Bill Heitritter, 1114½ Virginia St., Sioux City, Iowa; 3750 kc.; Mon. through Fri., 1600 CST, 5–13 w.p.m.

NATIONAL CALLING AND EMERGENCY FREQUENCIES

C. W.	*'PHONE*
3550 kc.	3875 kc.
7100 kc.	7250 kc.
14,050 kc.	14,225 kc.
21,050 kc.	21,400 kc.
28,100 kc.	29,640 kc.

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be *vacated immediately* to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: *c.w.* — 3535, 7050, 14,060; *'phone* — 3765, 14,160, 28,250 kc.

NATIONAL RTTY CALLING AND WORKING FREQUENCIES

3620 kc. 7140 kc.

These frequencies are generally employed by amateurs using radioteletype throughout the United States.

Floridians might have settled back in their easy chairs and yawned at the prospects we New Englanders faced during late August and early September, in the way of hurricanes. To us, Hurricanes Carol and Edna, screaming up the coast within a couple of weeks of each other and following very similar but not identical paths, were the first of any consequence we had experienced since 1944. At this time of writing we are in the middle of collecting reports on Carol, with those on Edna still to be received. Whether the volume of such reports will merit an up-front write-up or an Operating News subhead we don't yet know. In any event, the two hurricanes will be combined into a single write-up, probably in December *QST*. It is too late to get in your report of activities now, so we hope you have already informed us of any amateur participation in your area. This is just to let you know that further information is forthcoming, but amateurs are notoriously slow in consolidating all facts into written form for *QST*. December *QST* will do it, we hope.

—•••—

A good many emergency write-ups come to us completely devoid of dates. This is natural enough, since locally everyone knows when the emergency occurred. But in other parts of the country it is very likely that no one every heard of the flood in Jibib, Mo., and cannot nail it down when the write-up refers to "the recent flood" or an undated newspaper clipping mentions "the flood last Tuesday." A little help, gang? *Please* indicate the date of any emergency you are reporting.

—•••—

From a clipping forwarded by Northern Texas SCM W5JQD, we glean the following information concerning amateur participation in a flood emergency at Ozona, eighty miles southwest of San Angelo, Texas, sometime in late June or early July. W5JIG and W5ETL, on receipt of word that their services could be utilized, proceeded to Ozona with portable equipment, and upon arriving found that amateurs from Fort Stockton and Big Spring were already there. Equipment was set up adjoining the sheriff's office to handle the only means of communication to the outside for the public. The group sent more than 400 messages, many of them informal. W5GVQ and W5SWZ assisted the operation. The Northwest Texas Emergency Net did a great deal of the relaying of messages. Cooperation of all concerned was excellent.

—•••—

WØRRN reports his Field Day slightly interrupted by a scattering of tornadoes near Harrisburg, South Dakota. He was on 14 Mc. early in the FD, Saturday night, when the band suddenly went dead and he noticed a storm approaching. A little later a tornado was sighted near by, and two others put in their appearance, one coming toward them. They broke camp, loaded into their cars and sped to a crossroad from which they could outrace the twister in any direction. However, the tornado veered off; they followed it across the prairie, watching it demolish farm buildings as it went. It finally disappeared in the clouds, leaving wrecked buildings and scattered telephone and electric lines behind. The group was able to supply communications to the nearest working telephone for some telephone crews who were unable to reach the testboard, with mobiles WØs BLZ OOZ and RRN doing the transmitting. At one point they dissuaded a group of farmers from trying to move high-voltage lines which were down across the highway, and here, too, they may have saved some lives.

An interesting experience, says WØRRN. Sort of makes our Field Days seem tame, doesn't it, fellas?

—•••—

A pretty bad flood up Des Moines, Iowa, way last June saw a lot of activity on the part of the Des Moines Radio Amateur Association ten-meter emergency net and other amateurs in the vicinity. The regular publication of the above-named club gives us a complete account. Net control (KØFDB) was set up at police headquarters on June 22nd and manned by WØs SVD and NTA. This rig was in constant operation for 51 hours, taking some of the load off overloaded police communications. Civil defense auxiliary policemen rode with mobiles the first night, and later amateurs themselves acted as flood patrolmen. Some of the mobiles who served in the net: WØs DDW LJF EHH FSG ETU HIB LRY PRF GBB BSK OLY IQS QNO BBE NUC MYQ. Several mobileers got mobile rigs working from scratch when they got word they would be needed: WØs AUL (assisted by DFH and KHN), IUM and HOU. WØNWX came over from Newton, working with a temporary mobile hash-up, and WØs WML and VDQ came with him. WØBSG came from New Sharon and WØNOS from Grimes with their mobiles. The crew at KØFDB, besides those already mentioned, included WØs HOC FQW EKA WSJ PKH HUY LMM PKW WCH UOI and DSL. WØPZO worked on 75 meters and WØCQU served as carborne refreshment man for mobile operators.

—•••—

On July 3rd at 2330, W7KUH/M came upon a very bad highway accident shortly after it happened 25 miles east of Deer Lodge, Mont. At the time, he was in contact with K7FCC. Four men were lying on the highway and roadside, one of them dead and the others badly hurt. W7MM broke in and offered his services, and W7KUH/M requested he call the highway department to send out highway patrolmen and ambulances. Two ambulances were immediately dispatched from Deer Lodge and Helena, and a patrolman from Missoula. The fast communications may have saved the injured men's lives. During all the excitement, W7s GCV TVY and FTV were standing by to help if they could.

— *W7KUH, SEC Montana*

—•••—

On July 5th, W4TQU in his mobile got into a line of cars trying to get by a car which was weaving dangerously back and forth on the road. After following a while, W4TQU turned on his rig and finally succeeded in contacting

Many Canadian amateurs attended the first Canadian Civil Defense communications course at Arnprior, Ont. In fact, two thirds of the candidates were amateurs, many of them ARRL officials. Back row, *l. to r.*: Ex-G6AM, VE2s WV QN, VE6WT, VE1HZ, VE1DQ, VO2B, VO1T, VE2ATZ. Front row: A DOT inspector, VEs 7DD 2APR 5HR 6MJ 2BR 2KG 7ANK 2AMA 2FN 7TK and 6FF.

W4KGR, who called the police while TQU continued to follow the erratic driver. The offending driver was finally stopped by a police cruiser stationed in his path through advices via W4TQU and W4KGR, and taken into custody for reckless driving. (This information from another newspaper clipping.)

—•••—

On August 26th, the city of Westfield, Mass., had its first RACES drill under its new RACES authorization. The drill was conducted in conjunction with the local fire department which was having instruction in the use of its apparatus to auxiliary firemen, and turned out to be the real thing when someone ran down the street and into the police station shouting "Fire!" The RACES unit stationed there immediately reported to control. The unit at the fire station alerted firemen, and apparatus was on the way by the time the telephoned alarm came through. Other RACES units heard the commotion and got to the fire just in time to see someone ring the alarm from a near-by firebox. The prompt alerting enabled the fire department to extinguish the blaze before any appreciable damage was done. The fire, in a partly vacant house, was obviously a case of arson. RACES mobiles, after the fire, were useful in coördinating the direction of traffic by auxiliary police. Thus Westfield RACES had a very successful "trial by fire" at its initial test. — *W1UVI*

—•••—

For the second year in a row the amateurs of Dade, Broward and Palm Beach counties, Florida, furnished radio communications for the Gold Coast Marathon. With close to 200 boats participating there are bound to be some that develop trouble along the way. We had mobiles or portable stations on all the main bridges between Miami and West Palm Beach, and boat drivers were all notified as to the locations of such points. If they got into trouble they proceeded if possible to the nearest check point, and the mobile or portable there called in. We kept a log of all boat numbers and the time they passed each point and were able to trace a boat if it didn't reach the finish point. Two boats this year had to be tracked down in such a manner. Amateur stations also gave a running account so that officials knew just how the boats were progressing. The Flamingo Net, the Broward Radio Club and the Palm Beach gang divided up the course into segments, each taking responsibility for a part. Frequencies used by the above groups were 29,044, 29,400 and 28,960 kc., respectively. In Miami and Palm Beach, 3850 kc. was used for intercity traffic. The set-up worked very well and gave us a lot of experience in handling traffic. Something like seventy amateurs participated in the activity.
— *W4SDI and W4MVR*

—•••—

Fifteen SECS reported for 2857 AREC members in June. We welcome to the ranks of active reporters the SECs of Oregon and Oklahoma. The June record is slightly above that of last year when we received 13 reports on behalf of 2681 AREC members. The total number of sections reporting this year is 25, three more than in 1953.

WIAW OPERATING SCHEDULE

(*All times given are Eastern Standard Time*)

WIAW returned to its Fall-Winter operating schedule September 26th. Master schedules showing complete WIAW operation in EST, CST or PST will be sent to anyone on request.

Operating-Visiting Hours:
Monday through Friday: 1500–0300 (following day).
Saturday: 1900–0230 (Sunday). Sunday: 1500–2230.

Exceptions: WIAW will not observe its regular hours from 0300 Nov. 25th to 1500 Nov. 26th; from 0300 Dec. 24th to 1500 Dec. 26th; and from 0300 Jan. 1st to 1500 Jan. 2nd.

General Operation: Refer to page 70, September *QST*, for a chart to determine times during which WIAW engages in general operation on various frequencies, 'phone and c.w. This schedule is still in effect but is not reproduced herewith for space considerations. Note that since the schedule is organized in EST, certain morning operating periods may fall on the evening of the previous day in western time zones. WIAW will participate in all official ARRL operating activities, using scheduled general operating periods for this purpose if necessary.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies (kc.):
C.w.: 1885, 3555, 7125, 14,100, 21,020, 52,000, 145,600.
'Phone: 1885, 3950, 7255, 14,280, 21,350, 52,000, 145,600.
Frequencies may vary slightly from round figures given; they are to assist in finding the WIAW signal, not for exact calibration purposes.

Times:
Sunday through Friday: 2000 by c.w., 2100 by 'phone.
Monday through Saturday: 2330 by 'phone, 2400 by c.w.

Code Proficiency Program: Practice transmissions are made on the above listed c.w. frequencies, starting at 2130 daily. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7½, 10 and 13 w.p.m. on Sunday, Tuesday, Thursday and Saturday. Approximately ten minutes of practice is given at each speed. Code-practice transmissions will be replaced by Code Proficiency Qualifying Runs on Nov. 17th and Dec. 16th, and by a Frequency Measuring Test on Nov. 18th.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from WIAW will be made on November 17th at 2130 EST. Identical texts will be sent simultaneously by automatic transmittors on 1885, 3555, 7125, 14,100, 21,020, 52,000 and 145,600 kc. The next qualifying run *from W6OWP only* will be transmitted on November 6th at 2100 PST on 3590 and 7138 kc.

Any person may apply; neither ARRL membership nor an amateur license is required. Send copies of *all* qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions will be made from WIAW each evening at 2130 EST. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7½, 10 and 13 w.p.m. on Sunday, Tuesday, Thursday and Saturday. Approximately 10 minutes' practice is given at each speed. References to texts used on several of the transmissions are given below. These make it possible to check your copy. For practice purposes the order of words in each line of *QST* text sometimes is reversed. To get sending practice, hook up your own key and buzzer and attempt to send in step with WIAW.

Date	Subject of Practice Text from September *QST*
Nov. 2nd:	*The "Tur-Key" in Miniature*, p. 11
Nov. 5th:	*Have You Tried V.H.F. Mobile?*, p. 16
Nov. 8th:	*Build Your Own Panoramic Adapter*, p. 20
Nov. 10th:	*A Broad-Band Bandswitching Converter/Preselector*, p. 25
Nov. 16th:	*The Tin Can Low-Pass*, p. 28
Nov. 22nd:	*A Low-Cost Gallon*, p. 31
Nov. 25th:	*A Civil Defense Control-Station Transmitter*, p. 33
Nov. 30th:	*Hamshacks*, p. 48

A.R.R.L. ACTIVITIES CALENDAR

Nov. 6th: CP Qualifying Run — W6OWP
Nov. 13th-14th, 20th-21st: Sweepstakes
Nov. 17th: CP Qualifying Run — WIAW
Dec. 4th: CP Qualifying Run — W6OWP
Dec. 16th: CP Qualifying Run — WIAW
Jan. 7th: CP Qualifying Run — W6OWP
Jan. 8th-9th: V.H.F. Sweepstakes
Jan. 8th-23rd: Novice Round-up
Jan. 14th: CP Qualifying Run — WIAW
Jan. 15th-16th: CD QSO Party (c.w.)
Jan. 22nd-23rd: CD QSO Party ('phone)
Feb. 5th: CP Qualifying Run — W6OWP
Feb. 8th: Frequency Measuring Test
Feb. 11th-13th: DX Competition ('phone)
Feb. 14th: CP Qualifying Run — WIAW
Feb. 25th-27th: DX Competition (c.w.)
Mar. 5th: CP Qualifying Run — W6OWP
Mar. 11th-13th: DX Competition ('phone)
Mar. 15th: CP Qualifying Run — WIAW
Mar. 25th-27th: DX Competition (c.w.)

MEET THE SCMs

Douglas C. Johnson, VE1OM, who recently took over the post of SCM for the Maritime section, acquired an interest in amateur radio in June, 1938, and just three months later received his license.

SCM Johnson also serves the section as Official Relay Station and Route Manager, and enjoys taking part in the Sweepstakes (he won the 'phone section award in 1949, 1950 and 1951), VE/W and DX Contests, Field Day activities, and LO and CD Parties. At various times he has held office as president, secretary, and bulletin editor in the Halifax Amateur Radio Club and is currently chairman of the club's technical committee. He is a member of the

A-1 Operator and Rag Chewers Clubs and possesses WAVE, WAS, WAC, and Canal Zone Amateur Radio Association 10- and 25-Contact certificates.

Transmitting equipment in VE1OM's basement shack consists of the following: A 2-watter — 50L6–50L6 (also available for portable use, 'phone and c.w.); an 80-watter — Heathkit-814; a 50-watter — BC-696–6L6G; a 100-watter — 6L6–812; and a 20-watter — 6AG7–815. The receiver is an RCA AR-77E and antennas include a 133-ft. long-wire, a 67-ft. tuned doublet, a 14-Mc. ground-plane, a 28-Mc. folded dipole, and a 6-meter three-element fixed beam. The most-used band is 14 Mc., c.w. and 'phone.

Besides ham radio Doug is enthusiastic about gardening, hockey, and football and gets enjoyment from swimming and hiking. A former engineer with the Canadian Broadcasting Corporation, his present vocation is that of chief inspector for Cossor (Canada), Ltd.

NET DIRECTORY

We were a few days late getting this copy in and were thus able to include all nets registered up to and including Sept. 21, 1954. If you have registered since then, your net will be included in the January *QST* supplement. If you have not yet registered, please send us the date requested on page 68, Sept. *QST*.

Nets are registered in the ARRL Net Directory only on request, and upon receipt of the minimum basic information given below. The complete cross-indexed directory will be available in December.

Name of Net	*Freq. (kc.)*	*Time*	*Days*
Ala. Emerg. Net CW (AENB)	3575	1900 CST	Daily
Albuquerque (N. M.) VHF Net	146,802	1930 MST	Fri.
Amesbury (Mass.) CD Net	29,627	1930 EST	Wed.
Arlington (Mass.) RACES Net	53,400	2100 EST	Tue.
Bedford (Mass.) AREC and CD Net	29,500	1900 EST	Mon.
Bedford Club (Mass.) CW Net	3600	1815 EST	Tue.
Boston Emerg. Amateur Net	28,700	1930 EST	Mon.
Boston Mobile Radio Net	29,680	2000 EST	Daily
Cascade Net	29,200	1930 PST	Daily
College Net (CN)	3895	1600 EST	Thu.
		1515 EST	Fri.
Dade Emerg. Net (Fla.) (DEN)	29,044	1930 EST	1/3 Mon.
Deep Sea Dragnet (DSD)	3970	1145 EST	Mon.–Sat.
Earlybird Teenage Traffic Net	3980	0700 CST	Mon.–Sat.
Early Bird Transcontinental Net	3845	0445 CST	Daily
Eastern Mass. Net (EMN)	3660	1900 EST	Mon.–Fri.
Eastern Mass. Novice Net (ENN)	3735	1830 EST	Mon.–Fri.
Eighth Regional Net (8RN)	3530	1945 EST	Mon.–Fri.
		2130 EST	
Everett Civil Defense Net (Mass.)	29,560	2030 EST	Thu.
Flamingo Net (Fla.)	29,044	1930 EST	Fri.
Fla. Emerg. Phone Net (FEPN)	3945	1800 EST	Mon.–Fri.
Forest Hills (Ont.) Amateur Radio Club (FARCE)	3735	1900 EST	Sun., Mon., Wed., Fri., Sat.
Framingham (Mass.) Radio Club Net	28,700	2045 EST	Wed.
	145,350	2000 EST	Wed.
Franklin Co. (Ohio) Emerg. Net	145,260	1930 EST	Tue.
General Radio Net (Mass.) (GRN)	3650	1400 EST	Sun.
Great Lakes Amateur Radio Net	1880	1930 EST	Mon., Wed., Fri.
Greater Lynn (Mass.) Civil Defense Net	28,610	1845 EST	Tue.
Green Mountain Net (Vt.) (GMN)	3860	1200 EST	Mon.–Fri.
Gypsy Radio Club (Mass.) Emerg. Net	28,700	1945 EST	Wed.
Hingham (Mass.) Civil Defense Net	28,900	2100 EST	Tue.
Hit & Bounce Net	7150	0700 EST	Daily
Indiana Fone Net (IFM)	3910	0900 CST	Daily
		1830 CST	Mon.–Fri.
Interstate Phone Net	3980	1500 EST	Mon.–Sat.
Interstate Side Band Net	3980	2000 EST	Mon., Fri.
Illinois (CW) Net (ILN)	3515	1900 CST	Mon.–Fri.
Kansas CW Net (QKS)	3610	1830 CST	Mon.–Fri.
	1888	(Alt. freq.)	
Kansas Slow Speed Net (QKS-SS)	3610	1800 CST	Sat.
		1500 CST	Sun.
	1888	(Alt. freq.)	
Kentucky Net (KYN)	3600	1700 CST	Mon.–Sat.
		1900 CST	Mon.–Sat.
		0900 CST	Sun.
Labrador Phone Net	3780	2030 GMT	Daily
Lancaster (Pa.) Emerg. Net	146,000	2000 EST	Mon.
Lighting Bug Net	3955	2400 EST	Daily
Louisiana Emerg. Net	3725	1800 CST	Wed.
Merrimack Co. (N. H.) Emerg. Net (MCEN)	28,600	1830 EST	Tue.
Michigan QMN Net (QMN)	3663	1800 EST	Mon. Fri.
		1900 EST	
Milton (Mass.) Emerg. Net	28,620	1930 EST	Mon.
Mission Trail Net (MTN)	3685	2000 PST	Mon.–Sat.
	3854	1900 PST	Daily
	145,080	1930 PST	Mon.–Fri.
Mo. Emerg. Phone Net (MEN)	3900	1830 CST	Mon., Wed., Fri.
Missouri Traffic Net (MON)	3580	1900 CST	Mon.–Fri.
Montana Phone Net	3910	1830 MST	Mon., Wed., Fri.
Montana State Net	3520	1900 MST	Sun., Tue., Thu.
New Bedford (Mass.) Emerg. Net	29,400	1000 EST	Sun.
New England 75 Meter Phone Net	3870	0900 EST	Sun.
Newton (Mass.) Emerg. Net	53,640	1900 EST	Tue.
	145,620	2100 EST	Sun.
N. Y. C.-L. I. CW Traffic Net (NLI)	3630	1930 EST	Mon.–Fri.
N. Y. State CW Net (NYS)	3615	1730 EST	Mon.–Sat.
N. Texas Emerg. Net (NTEN)	3930	0800 CST	Sun.
Norwood CD Net (Mass.)	28,610	2100 EST	Mon.
Novice Hurricane Net	3725	0800 EST	Sun.
	7188	1000 EST	Sun.
Old Dominion Net (ODN)	3845	1300 EST	Mon.–Fri.
Ontario Section Net (OSN)	3535	1900 EST	Daily
Palmetto Net (FN)	3675	1900 EST	Mon.–Fri.
Post Road Emerg. Net	28,590	1900 EST	Mon.
Quincy Mass. Emerg. Net	28,620	1930 EST	Mon.
	146,808	1030 EST	Sun.
		1930 EST	Mon.
Quincy Mass. Sector 5 CD Net	28,590	2000 EST	Mon.
Randolph CD Net	28,560	1900 EST	Mon.

River Forecast Net (RFN)	3910	1800 CST	Mon.–Fri.
		0900 CST	Daily
	3656	0700 CST	Sun.
	7170	0700 CST	Sun.
Rockingham Co. (N. H.) Emerg. Net (RCEN)	3685	1000 EST	Sun.
Second Regional Phone Net	3980	1000 EST	Mon.–Sat.
Sector 4 Net (Mass.)	28,640	2100 EST	Thu.
So. Dak. CW Net (SD)	3640	1900 CST	Mon., Wed., Fri.
Southern Calif. Net (SCN)	3600	1830 PST	Mon.–Fri.
		1930 PST	Mon.–Sat.
		0900 PST	Sun.
Tarrant Co. Disaster Control Net (Tex.) (TCDCN)	3970	1300 CST	Sun.
Teen Agers' Net	3630	1815 EST	Daily
Third Regional Net (3RN)	3590	1945 EST	Mon.–Fri.
Totem Emerg. Net (TEN)	29,000	2000 PST	Tue.
Traffic Handling Net	3663	1200 EST	Mon.–Fri.
Transcontinental Phone Net	3970	1730 EST	Daily
U. S. Coast Guard Auxiliary Net (7 Dist.)	3855	1815 EST	Fri.
United Trunk Lines (UTL) (East)	3565	2100 EST	Daily
	3570	2015 EST	Daily
(Central)	3565	2115 CST	Daily
	3570	2000 CST	Daily
(West)	3570	1915 PST	Daily
United Trunk Lines (UTL)	7110	1900 CST	Daily
		2100 CST	Daily
Upper Cumberland Net	3980	0615 CST	Mon.–Fri.
Vermont CW Net (VTN)	3520	1900 EST	Mon.–Fri.
Virginia Net (VN)	3680	1900 EST	Mon.–Fri.
Virginia Overflow Net (VON)	1820	1930 EST	Mon.–Fri.
Virginia Slow-Speed Net (VSN)	3680	1830 EST	Mon.–Fri.
Waltham (Mass.) CD Net	146,800	2200 EST	Mon.
Wash. Section Net (WSN)	3575	1900 PST	Mon.–Fri.
		1945 PST	Mon.–Fri.
	1988	1900 PST	Mon.–Fri.
		1945 PST	Mon.–Fri.
Weather Amateur Radio Net (WARN)	3675	1900 EST	Mon., Wed., Fri.
Welksley Civil Defense Net	147,250	0900 EST	Sun.
Weymouth CD Net	147,186	1100 EST	Sun.
		1930 EST	Mon.
Weymouth-Holbrook Net	28,570	1900 EST	Mon.
Winthrop Emerg. Net	146,520	1830 EST	Mon.
Wisconsin CW Net (WIN)	3625	1800 CST	Daily

579X? T6? 478K? T7?

Accurate honest signal reports are one of the marks of a good operator. Whether a c.w. report of RST 589X, or Readability 5 Strength 8 by voice, keep your reports worth


THE R-S-T SYSTEM

READABILITY

1 — Unreadable.
2 — Barely readable, occasional words distinguishable.
3 — Readable with considerable difficulty.
4 — Readable with practically no difficulty.
5 — Perfectly readable.

SIGNAL STRENGTH

1 — Faint signals, barely perceptible.
2 — Very weak signals.
3 — Weak signals.
4 — Fair signals.
5 — Fairly good signals.
6 — Good signals.
7 — Moderately strong signals.
8 — Strong signals.
9 — Extremely strong signals.

TONE

1 — Extremely rough hissing note.
2 — Very rough a.c. note, no trace of musicality.
3 — Rough low pitched a.c. note, slightly musical.
4 — Rather rough a.c. note, moderately musical.
5 — Musically modulated note.
6 — Modulated note, slight trace of whistle.
7 — Near d.c. note, smooth ripple.
8 — Good d.c. note, just a trace of ripple.
9 — Purest d.c. note.

If the signal has the characteristic steadiness of crystal control, add the letter X to the RST report. If there is a chirp, the letter C may be added to so indicate. Similarly for a click, add K. The above reporting system is used on both c.w. and voice, leaving out the "tone" report on voice. Turn card over for examples.

ARRL Communications Department Operating Aid No. 3

while by following the RST System. A convenient desk-size card copy of this Operating Aid No. 3 is available upon request from the ARRL Communications Department.

BRIEF

The Society of Amateur Radio Operators (San Francisco) put on the transmitter hunt for the Pacific Division Convention gang. *SARO News* recently carried a W6IMA selective-receiver diagram and three pages of experience on the subject of loops and hunts. Nice going!

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for August traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	212	2545	2111	429	5297
W4PL	7	1124	935	159	2225
W7BA	26	995	955	36	2012
W9VBZ	119	866	838	59	1882
W3WIQ	78	886	843	34	1841
WØSCA	10	598	522	71	1201
W7PGY	17	588	554	34	1193
W9IDO	14	557	470	101	1142
W2JOA	55	537	476	40	1108
W7FRU	6	517	475	38	1036
W9NZZ	268	380	1	377	1026
W2KFV	26	482	434	48	990
W6PHT	33	461	371	74	939
W2HO	15	452	430	22	919
W7SFN	3	443	426	3	875
W5MN	33	413	311	97	854
WØGAR	16	405	418	3	842
K6FCZ	37	393	382	11	823
W2KEB	41	382	293	99	815
K1WAB	792	0	0	0	792
K6FCY	116	322	290	32	760
W6LYG	21	353	283	70	727
W6QMO	54	330	162	177	723
W8RJC	5	353	327	24	709
WØBDR	4	356	340	8	708
W4VKE	76	313	297	16	702
W5AHQ	8	336	326	10	680
WØBLI	5	335	318	12	670
W6ELQ	4	335	286	36	661
KP4ZW	23	316	313	3	655
W2JZX	51	308	159	111	629
W5TFH	12	292	217	75	596
W9QBQ	37	301	231	14	583
WØQXO	22	281	194	86	583
W6IZG	16	279	245	26	566
W9WWJ	41	234	191	84	550
W8ELW	14	253	251	19	537
W6CPI	8	262	251	14	535
W6SWP	29	252	210	43	534
W4OGG	10	260	230	25	525
W4WXZ	9	248	217	40	514
W9TT	16	255	215	18	504
W9JUJ	11	256	213	23	503
W1UKO	2	249	231	18	500
Late Reports:					
W3CVE (July)	49	584	497	87	1217
W2BO (July)	6	448	443	20	917
WØBDR (July)	6	337	318	10	671
W5MN (June)	36	297	217	90	640
W8ZGT (June)	25	264	264	8	561

More-Than-One-Operator Stations

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
KA2FC	1691	1587	1205	367	4850
W6IAB	72	1660	1540	120	3392
KA2FC	859	843	633	185	2520
K7FDB	25	1014	944	19	2002
KØAIR	44	946	896	50	1936
KØFAU	155	744	720	24	1643
KØWBN	121	457	689	95	1362
K4WAR	173	472	583	60	1288
K6FDG	46	579	542	26	1193
KH6AJF	161	551	426	52	1190
KA2AK	606	168	131	37	942
KA7RC	113	278	268	14	673
KA2GE	229	185	128	44	586
K9FCA	85	199	264	19	567
Late Reports:					
KA2FEC (July)	60	2425	2296	72	4853
KA2FC (July)	1691	1587	1205	367	4850
W6IAB (July)	62	1810	1627	183	3682
KA2YA (July)	121	1518	1513	42	3194
KA4DR (July)	92	666	625	41	1424
KA2ZZ (June)	35	660	631	29	1355
KA2SL (July)	350	420	300	120	1190
W3USA (July)	41	577	469	101	1188
KA9MF (July)	90	418	374	31	913
KA7RC (July)	167	265	288	23	743
KA2AK (July)	465	127	84	43	719

BPL for 100 or more *originations-plus deliveries:*

KA2HQ	251	W1UTH	133	W8ARO	109
VO6N	238	W8MLR	126	W6CMN	108
K2CBD/1	220	KA2MC	120	VE3ATR	106
W6USY	194	W9CXY	119	K2DZP/VO2	106
W8PHU	186	W6FVK	117	W4YRO	105
KA8AB	145	VE1FQ	113	K2DVT	104
W8NOH	136	W9QQG	110	W1WNH	102

More-Than-One-Operator Stations

WØENA	163	Late Reports:		KA2NY (June)	129
KA2NY	107	KA2NY (July)	223	KA2NY (May)	113
		KA2GE (July)	201		

The BPL is open to all amateurs in the United States, Canada, Cuba, and U.S. possessions who report to their SCMs a message total of 500 or more, or 100 or more originations-plus-deliveries for any calendar month. All messages must be handled on amateur frequencies, within 48 hours of receipt, in standard ARRL form.

TRAFFIC TOPICS

A few years ago we introduced a thought into this column that stirred up a little controversy — the thought that perhaps we should consider the limitations of our traffic-handling service in terms of duration of net sessions. The underlying theme was that the bands are crowded, no net has an option on any frequency, and if we are to continue expansion of our traffic and emergency services in the future as we have in the past, we should give more thought to sharing frequencies among nets, and this means setting a time limit on net sessions. This in turn means a limit in the amount of traffic we are able to handle in a single net session.

At that time many traffic men felt that the idea of limiting the amount of traffic we handled was ridiculous since however much was originated, that much had to be handled. Get the traffic through at all costs was the slogan. If we examine our traffic function more closely, however, we'll have no alternatives but to come to the conclusion that there are but two basic reasons, from a service standpoint, why our traffic-handling services are important: (1) training as individuals in handling record traffic, and (2) organization as groups so that traffic can be handled efficiently and effectively. The importance of the traffic itself is minor; otherwise it probably would not be on amateur circuits — during normal times, that is.

During the shank of a winter evening our 80-meter band is practically one mass of nets, from 3500 to 4000 kc. The peak of net activity is around 1900 local time, although old man propagation has been doing his utmost to move it up an hour or so. Traditionally, it has become the practice of nets to consider a certain frequency "their" frequency, and to resent any encroachments on it, not by individual amateurs bent on chewing the rag, but by other nets operating at times other than theirs. This is a concept which is fast going out the window on 75 meters, and must of necessity do likewise on 80-meter c.w. if we are to handle our traffic effectively — as opposed to the concept of hustle-shuttle nets which remain in session all evening and send representatives skittering hither and thither all over the band to obtain and distribute traffic among other nets. As long as most of the traffic nets continue to use the 80-meter band, as seems indicated, the time-sharing of channels will become more and more necessary. One net will have to terminate its operation at a specific time so that another net can begin. It is thus necessary to specify not only a time at which a net drill begins, but also a time at which it *closes*.

Many old-time traffickers will throw up their hands in horror at the idea; but it has its advantages. Nets will need to concentrate on efficiency, in order to clear their traffic in the allotted time; therefore, our net procedure will improve. Stations will be encouraged to QNI *on time;* otherwise they may not be able to clear their traffic. Stations reporting in will not be held up unduly, will be free to QNO when time runs out at the latest; knowing this, it is likely that more stations will QNI. Traffic not cleared during the regular net session will be cleared on other nets as "overflow" traffic, thus permitting freer interlocking of our traffic facilities. And the "best" net will be not the one which, by hook or crook or long hours of operating can handle the most traffic per month, but the one which through snappy, efficient, precise operating can handle the greatest amount of traffic accurately in its allotted time. And through *systematic* handling of traffic necessitated by such a concept, the flow will be actually faster, generally speaking, than was the usual case in the hodgepodge past and with the diminishing number of hodgepodge nets today. Shall we try it, gang?

—•••—

Two miscellaneous net reports: The Early Bird Net traffic count for August was 548, according to W8AMH. Reporting for seven stations of the Transcontinental 'Phone Net, W1RNA indicates a traffic count of 541 for August.

—•••—

National Traffic System. Well, we're off on a brand new season, complete with lousy conditions and all the other usual accouterments such as scrapping about a net frequency, complaining about QRM, hassling about liaison assignments, etc. The stirrings of new activity have been particularly felt, this year in NTS, in the form of some new ideas and proposals from the field. This would be a good place and time to lay them before all you NTSers.

1) Instead of using 5-kc. spacing for QNY purposes, one net manager suggests we use 3 kc., says his net uses it successfully.

2) How about a TCC net on 40 and/or 80 meters, with an NCS (or two) for the evening to clear interarea traffic? TCC stations from area nets can then simply QNI to clear traffic as soon as they collect it. At least one representative from each area would be on deck each night to receive such traffic and either take it to his area net or distribute it among section and regional nets. The TCC net would be a national clearinghouse.

3) Abolish area nets and TCC completely and utilize trunk lines to connect the various regional nets together. This proposal has some popularity in the west where difficulty is being experienced in staffing area nets and the TCC, but is not so popular in the east where both the area nets and TCC are completely staffed, including alternates for most positions.

4) Make regional and area nets "closed" nets to all except duly designated representatives, requesting all outsiders to report their traffic and handle same at section level.

These proposals are merely being presented for your appraisal. They are not necessarily a reflection of the opinion of this office, and *none* of them originated here. Let us know how you feel about all or any of them, or what others you have in mind.

August reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation %*
1RN	21	241	0.33	11.4	95.9
3RN	22	191	0.45	8.7	93.9
4RN	25	163	0.56	6.0	41.9
RN6	44	333	——	7.5	——
RN7	51	485	——	9.5	29.0
8RN	21	131	——	6.4	90.5
9RN	37	322	0.46	8.7	69.0
TEN	70	1457	——	20.8	54.8
TRN	22	84	0.55	3.8	56.1
EAN	22	541	0.80	24.6	96.2
CAN	22	479	——	21.7	95.5
PAN	22	674	0.54	30.6	86.4
Sections*	285	1696	....	6.0	....
Summary	664	6797	EAN	10.2	EAN
Record	664	6797	....	14.8 (53)	....

*Section-level nets reporting: QKS/QKS-SS (Kans.), AENB/AENP (Ala.), IFN (Ind.), WVN (W. Va.), ILN (Ill.), WSN (Wash.), Tenn. Hi-Speed, Minn. 'Phone, CN (Conn.), BAN (Bay Area, Calif.).

The best 3RN representation at present is being provided by MDD, principally W3s COK HKS TGF and WV. W6JOH is having trouble keeping up with the RN6 managerial job, but sticking with it. W7KZ wants to resign as RN7 manager, but the Pacific Area staff is trying to talk him out of it. Kentucky and Indiana are now providing regular representation to 9RN, and, as W9UNJ puts it, "things are looking up"; W4ZLK has received his 9RN certificate. TRN performed better than usual during the summer, and VE3BUR relinquishes managership of this improving net. W8ILP has received one of those hard-to-get EAN certificates. W9UJJ reports CAN had a successful August due, primarily, to the efforts of W9DO, WØBZK and WØSCA. CAN certificates went to W9DO and WØBZK.

The Transcontinental Corps, generally speaking, is holding together well in the Eastern Area, but has had a rather shaky summer in the Central and Pacific Areas. The Eastern Area roster is almost completely filled at this writing, including alternates for each assignment. We need more TCC help from the Midwest and Mountain States, and the Pacific Coast. Anyone interested please contact your TCC Area Director: W6HC for Pacific and Mountain Time Zones; W9UJJ for Central Time Zone; W8UPB for Eastern Time Zone. You need two things for successful participation: good operating ability (so far all TCC work is being performed on c.w.) and a strong signal. HW?

Following is the complete TCC roster as of September 30, 1954: *Eastern Area* (W8UPB, Director) — W1s AW EMG NJM WNH, W2s RUF ZVW, W3COK, W4s KRR ZFV, W8s DQG DSX FYO ILC JAR RLR YCP, VE3s BJV EAM GI TM VZ. *Central Area* (W9UJJ, Director) — W4AGC, W5KRX, W9s JUJ RXD UNJ, WØSCA. *Pacific Area* (W6HC, Director) — W6s EFD IPW JZ KPQ LDR QPY UTV WOC, K6BDF, W7s CCL TGU, WØs IC KQD ZJO. The status of some of the above is questionable. Area Directors are realigning their assignments so that a large turnover may be expected in the next month or so.

Section Emergency Coördinators of the Amateur Radio Emergency Corps

The Section Emergency Coördinator is appointed by the SCM to take charge of the promotion of the Amateur Radio Emergency Corps organization throughout the Section. He acts as the SCM's executive in the furthering of provisions for emergency amateur radio communications in every community likely to suffer in case of a communications emergency. One of the duties of the SEC is to recommend the appointment of Emergency Coördinators for the various communities in his Section. Does *your* town have an EC? If not, recommend the name of a likely prospect to the SEC. The SEC invites your questions concerning the status of the AREC in your Section.

ATLANTIC DIVISION				
Eastern Pennsylvania	W3GGW	Howard J. Trout	1100 Morris Ave.	Pottstown
Maryland-Delaware-D. C.	W3PRL	John W. Gore	3707 Woodbine Ave.	Baltimore 7, Md.
Southern New Jersey	K2BG	Herbert C. Brooks	800 Lincoln Ave.	Palmyra
Western New York	W2UTH/FRL	Henry A. Blodgett	515 Victor-Holcomb Rd., Rt. 2	Victor
Western Pennsylvania	W3GEG	Alfred C. Heck	515 Cedar Ave.	Sharon
CENTRAL DIVISION				
Illinois	W9HOA	A. B. Brand	1211 Harlem Blvd.	Rockford
Indiana	W9LZT	J. Herman Barnett, jr.	20 Meridian Pl.	Indianapolis 5
Wisconsin	W9OVO	Clayton Cardy		Sawyer
DAKOTA DIVISION				
North Dakota	WØRRW	E. G. Anderson	1413 11th St. N.	Fargo
South Dakota	WØGCP	Wilbur Simantel	113 E. 10 St.	Mitchell
Minnesota	WØGTX	George P. Lord	P. O. Box 8	Alexandria
DELTA DIVISION				
Arkansas	W5MRD	Omer Sanders	Box 194	Danville
Louisiana	W5IUG	E. B. Hazlewood	9990 New Hammond Hwy.	Baton Rouge
Mississippi	W5KHB	George P. Adams	1038 N. Pine St.	Natchez
Tennessee	W4RRV	S. B. DeHart	227 S. Purdue	Oak Ridge
GREAT LAKES DIVISION				
Kentucky	W4NBV	Rev. C. L. White	104 Mound St.	Harlan
Michigan	W8GJH	Francis E. Gary	620 Thayer St.	Flint 3
Ohio	W8UPB	Dana E. Cartwright, sr.	2979 Observatory Rd.	Cincinnati 8
HUDSON DIVISION				
Eastern New York	W2RTE	Theodore L. Buley	391 Vassar Rd.	Poughkeepsie
N. Y. C. & Long Island	W2ZAI	James R. Waite	9 Landau St.	Elmont, L. I.
Northern New Jersey	W2NKD	Thomas J. Ryan, jr.	1082 Anna St.	Elizabeth 4
MIDWEST DIVISION				
Iowa	WØVRA	Jack P. Henry	1215 Vine St.	Waterloo
Kansas	WØPAH	W. G. Schrenk	1528 Pierre St.	Manhattan
Missouri	WØVRF	O. H. Huggins	3605 E. 72nd St.	Kansas City
Nebraska	WØJDJ	Francis B. Johnson	820 S. 44th St.	Lincoln 8
NEW ENGLAND DIVISION				
Connecticut	W1LKE	Peter R. de Bruyn	163 S. Marshall St.	Hartford 5
Maine	W1BYK	Donald R. Dean	36 James St.	Auburn
Eastern Massachusetts	W1BIL	Raymond E. Boardman	54 Thurston Rd.	Newton Upper Falls 64
Western Massachusetts	W1KUE	Thomas F. Barrett	759 White St.	Springfield
New Hampshire	W1BXU	William E. Goldthwaite	24 Franklin St.	Concord
Rhode Island	W1MIJ	Carl M. Getter	185 Early St.	Providence
Vermont	W1SIO	Carl M. Anderson	9 West St.	Brattleboro
NORTHWESTERN DIVISION				
Alaska	KL7TI	James Heay	Box 1238	Juneau
Idaho	W7IWU	Alan K. Ross	2105 Irene St.	Boise
Montana	W7KUH	Walter R. Marten	3021 6th Ave., So.	Great Falls
Oregon	W7ESJ	Edward F. Conyngham	11901 Powell Blvd.	Portland 66
Washington	W7QZF	Samuel H. Foster	5717 37th Ave., S.W.	Seattle 6
PACIFIC DIVISION				
Hawaii	KH6AS	John Keawe	714 Ocean View Dr.	Honolulu
Nevada	W7JU	Ray T. Warner	539 Birch St.	Boulder City
Santa Clara Valley				
East Bay	W6WGM	Jay Amaro	199 Harrier St.	Vallejo
San Francisco	W6NL	Samuel C. Van Liew	215 Knowles Ave.	Daly City
Sacramento Valley	W6JEQ	L. B. LaDue	5400 Carmen Way	Sacramento
San Joaquin Valley	W6LBL	F. E. Robinson	P. O. Box 714	Sonora
ROANOKE DIVISION				
North Carolina	W4ZG	Roy C. Corderman	792 Oaklawn Ave.	Winston-Salem
South Carolina	W4DX	Ben L. Team	Route 3 Box	Camden
Virginia	W4NAD	William E. Sampson, jr.	4801 Stuart Ave.	Richmond
West Virginia	W8YPR	S. A. Whitt	500 Kirk St.	Princeton
ROCKY MOUNTAIN DIVISION				
Colorado	WØMMI	Marie Ellis	608 Lesser Drive	Fort Collins
Utah	W7JOE	John Tempest, jr.	1599 Orchard Dr.	Salt Lake City
Wyoming	W7LKQ	Duane L. Williams	1022 S. Cherry, Apt. 4	Casper
SOUTHEASTERN DIVISION				
Alabama	W4ISD	P. G. Persson	124 Margaret St.	Mobile 17
Eastern Florida	W4IM	G. B. Angle	1537 S.W. 41st Ave.	Fort Lauderdale
Western Florida	W4PLE	Landon L. Floyt	29 Elliotts Rd.	Fort Walton Beach
Georgia	W4OPE	U. B. Abbott	809 McMillan St., N.W.	Atlanta
West Indies (Cuba-P.R.-V.I.)	KP4HZ	Jorge ¶ Toledo	213 Union St.	Miramar, Santurce, P. R.
Canal Zone	KZ5RM	Roger M. Howe	Box 462	Balboa Heights
SOUTHWESTERN DIVISION				
Los Angeles	W6QJW	Howard F. Shepherd, jr.	127 So. Citrus Ave.	Los Angeles 36
Arizona	W7VRB	George G. Schluchter	713 E. Stella Lane	Phoenix
San Diego	W6VFT	Ben S. Hamilton	8447 Denton	La Mesa
Santa Barbara				
WEST GULF DIVISION				
Northern Texas	W5RRM	Cecil C. Cammack	3750 Brighton Rd.	Fort Worth
Oklahoma	W5KY	Robert D. Reed	4139 So. Peoria	Tulsa
Southern Texas	W5GLS	George N. Sharp	3541 Federal St.	Pasadena
New Mexico	W5KCW	Verl A. Coleman	418 Kathryn St.	Santa Fe
CANADIAN DIVISION				
Maritime	VE1RR	Holland H. Shepherd	15 Flint St.	Fairview, N. S.
Ontario	VE3KM	T. W. Clemence	2278 King St., East	Hamilton
Quebec	VE2BR	A. George Brewer	4334 Montrose Ave.	Westmount, Montreal
Alberta	VE6MJ	Sydney T. Jones	10706-57th Ave.	Edmonton
British Columbia	VE7DH	William J. Emerson	693 Sixth St.	Nanaimo, Vancouver Island, B. C.
Yukon				
Manitoba				
Saskatchewan	VE5LU	Lionel O'Byrne		Rowatt

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, W. H. Wiand, W3BIP — SEC: IGW, RM: AXA, PAM: PYF. E. Pa. Nets: 3610, 3850 kc. The York ARC purchased a trailer on which to mount its 2.5-kw. generator used for Field Day power and emergency purposes. An instructograph also was purchased for the purpose of conducting tests for Novice and Technician Class licenses with which four tests have been given to date. The Club's annual picnic was enjoyed by 50 members and friends on Aug. 17th. The Western Pa. Amateur Radio Club Council invites all E. Pa. amateurs to participate along with the W. Pa. amateurs in a state-wide Pennsylvania County QSO Contest to be held Nov. 15th through Dec. 14th. Belated congratulations to QOR and his YL on their recent marriage. While on their honeymoon to Bermuda, they met some of the VP9 boys. DUI reports six new Novices in his area. WNs 3ZKL, ZLP, ZMZ, ZOZ, ZQA, and ZQB. PYF reports BO, NNT, RXV, and RXW all new regulars to PEN, the latter two being an XYL/OM team. VDV is rebuilding with a 4E27A in the final stage. IXG has a new Gonset Communicator. SAA recently completed a 10-meter mobile installation in his station wagon using a Babcock MT5B transmitter and an RME MC55 converter with a PE101C furnishing the power. AXA reports the E. Pa. Net started its fall season Sept. 1st with 11 stations reporting. The E. Pa. Net picnic was a success in spite of the rainy WX throughout most of the section. Not a drop of rain fell at the picnic site, Crystal Cave, Pa. Kindly forgive the short write-up, fellows. Yours truly is in the midst of getting settled in a new home. Please note the change of address and mail all reports to RD 1, Box 300, Gilbertsville, Pa. C U on the air soon. Traffic: (Aug.) W3CUL 5297, BFF 431, OZV 259, RSC 113, NOK 111, VNJ 82, TEJ 62, GIY 52, PYF 32, TTW 27, RXW 25, UOE 24, VKW 18, UWP 17, YJM 17, PVY 14, QLZ 14, TYU 11, DUI 9. (July) W3JNQ 6.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Arthur W. Plummer, W3EQK — CIQ reports she now is on the air with a Viking II and that YA visited Washington, D. C., in August. PRT returned from the Signal Corps ROTC, got 150 watts on the air with an 812, and snagged 3 ZLs on 7 Mc. PQF was /1 in Maine this summer. QQS now is using a new NC-98 receiver. LDD reports an FB communications plan being set up. DRD now has 40-ft. steel tower for 14-, 21-, and 28-Mc. beams. VXF is leaving Baltimore for a year and will be in New York this fall. OSF would like to hear more activity on 10 meters during LO-Parties. EEB has just completed a Johnson Ranger. CVE reports that 8CJK, Dayton, Ohio, now is TCRN representative. 6KYV is recovering from an illness. 4PL is back on the air. 9UNJ has been with TCRN for a year. TGF still is on the air with 30 watts but has a better skywire now. WKB reports adding Match Box to rig and soon will be completely bandswitching throughout. SPI reports the following new calls in Kent County, Del.: WN3s ZEU, ZEV, ZIQ, ZIR, ZIS, ZIT, ZIV, ZJI, ZNB, ZNC, ZNE, ZNF, ZNT, and W3ZNU. RV will be an ORS after he completes a trip which will take him to Texas, Alabama, Mississippi, Georgia, Ohio, and Pennsylvania. On Sept. 13th the CARC was addressed by Dr. Willard Laning on "Uses of Various Types Tubes and How to Read and Use Tube Charts and Curves." The Sept. 27th meeting had William H. Miller, Superintendent of Electrical Inspection of the Division of Maryland Fire Underwriters Rating Bureau, and Louis E. Susemihl, of the Baltimore County Electrical Board, who spoke on "Standard Requirements and Installation Methods with Regard to Antennas, Grounds, etc." NPQ has been active on 2 meters. MCD recently acquired an ART-13. Tony says when he finally gets all the gear lined up he will have 25, 100, 200, and 500 watts 'phone and c.w., plus some emergency gear in operation. The CARC had an interesting talk at its Aug. 23rd meeting by J. L. Hossenauer and B. F. Wickline of the Downing Crystal Co. on "Techniques of Crystal Manufacture." In spite of the weather a good number showed up at the BARC picnic at Triton Beach on the Chesapeake. FRD and FVK won mobile installation prizes for the best mobiles. JZY won a Gonset Clipper so now he'll have to go mobile! JCL M.C.ed the affair. Ed Nichols won two transformers and EQK won an XE-10 Sonar FM exciter. 6UAT attended with his XYL, YL, son, and mother. FH won an RK-38 tube. WKB received a 75-meter crystal and 40HM a 40-meter crystal. 1LOX now is operating /3 and is connected with Westinghouse at Friendship International Airport Plant. KZ5GS has been transferred from Canal Zone to Naval Radio Station at Cheltenham, Md. EQK recently had visitors from El Salvador, namely Miss Zoila Nusen, whose father and YS1MS built the two commercial radio stations in El Salvador, and Mrs. J. A. Meardi and little daughter. She is the XYL of YS2AM. Other visitors were Arthur R. Andrody and wife, Gloria, daughter of the Salvadorian Ambassador to the United States and HP1GD, George Dawson, and Mrs. Dawson from Panama. EQK returned to Baltimore the middle of August after a 5500-mile trip which took him to Albuquerque, where he stayed with 5LGS and visited 5NNE and 5AKR. Others visited were 5CA, West Gulf Division Director, 5RFK, 5RFJ, and 4MKB. The youngest member of Andrews Electronic Association is reported to be WN3ZKJ, who is 12 years of age. WBP, Maryland's State C.D. Net Control, is operating on 2-, 10-, and 75-meter 'phone and 80-meter c.w. 20-meter activity around Baltimore is on the upswing both on 'phone and c.w. We heard BYI, HWZ, and IQP on 'phone recently and LOE also is going full blast. WSL is back in the swing again. PXM/4YQC now is QTHing at Headquarters Squadron Section, Air Missile Test Center, Patrick Air Force Base, Cocoa, Fla. OYX went off the air for rebuilding purposes in August. GEB and YGZ are stocking up on all sorts of ham gear and stay open each night. UXO has returned from a Maine vacation where he visited RUW and WXI. UXO entered Valley Forge Military Academy Sept. 7th. QCB says he will be active in MDD, SSN, and ESN again this season. The MDD Section Net will be going full blast by the time this gets into print. GR and BVL also have been heard on 20-meter 'phone. Traffic: (Aug.) W3COK 85, PKC 71, ONB 56, RV 43, JE 20, JZY 12, QCB 9, TGF 6, NNX 4, WBP 4, OYX 3, WSE 1. (July) W3CVE 1217, USA 1188, COK 52, ONB 48, RV 48, CQS 23, DRD 22, JE 20, TGF 14, NNX 4, OYX 4, QQS 4, IIKS 2, WOR 2.

SOUTHERN NEW JERSEY — SCM, Herbert C. Brooks, K2BG — PAM; W2ZI. HAZ recently received his WBE certificate. *Harmonics*, the SJRA monthly paper, now has a DX column edited by SDB. Bill's new QTH is Haddonfield. BLV lost his 68-ft. tower in a recent wind storm. REB also was unfortunate in losing his tower from the same cause. EWT has received his General Class ticket. BDA has a half-kw. on 10 meters and is doing a swell job. ZUL has been trying a vertical antenna on 40 meters. A number of South Jersey boys attended the Philmont Radio Club picnic. DQR is putting up a new 20-ft. tower on his roof to support a 20-meter Minibeam. CCO is doing FB on 20-meter 'phone. We believe Les is getting close to DXCC. ZQ continues to do a swell job on several bands. The Mercer Emergency Net plans to renew operation this fall on Sun. at 9 P.M. VMX, of Ventnor, hopes to have Collingswood as his new QTH this fall. The NJCD Net solicits representation from the southern counties, especially Cumberland and Cape May, Sun. nights on 3505.5 kc. RG is Net Control. The Burlington County Radio Club expects to have regular weekly drills on both 2 and 10 meters this fall. Your SCM would appreciate reports of nets that have not heretofore reported their activities. Traffic: W2RG 172, K2BG 61, W2ASG 22, ZI 10, HAZ 2.

WESTERN NEW YORK — SCM, Edward G. Graf, W2SJV — Asst. SCM, Jeanne Walker, 2BTB. SEC: UTH/FRL. RM: RUF. PAMs: GSS, NAL. NYS meets on 3615 kc. at 6:30 P.M., 3925 kc. at 7 P.M., NYSS on 3595 kc. at 8 P.M.; NYS C.D. on 3501.5 and 3993 kc. at 9 A.M. Sun.; TCPN, 2nd call area, 3970 kc. daily; SRPN on 3970 kc. at 10 A.M. daily; ISN on 3980 kc. at 3 P.M. daily. The new QTH of K2QHH is Rochester. EMW received WASM, WAN, and DUF certificates. QHH is getting acquainted with NYS hams on the 75- and 80-meter nets. K2CUQ was on 80 meters for DX. Sorry to hear of the passing of K2BFN's mother. Before RUF left on a tour of the western states she put up a 20-meter beam which worked out FB. BTB visited SZG. The Ithaca Club operated the e.d. booth at the Tonkins County Fair handling 154 e.d. messages. SWF, formerly of Sampson, visited ZOL and BTB. He and Dick then attended the Early Bird Net get-together at the Toledo Yacht Club. RUT now is operating from the basement shack. K2ANC is working at RCA in Camden.

(Continued on page 86)

Edger F. Johnson

THIRTY YEARS AGO, in November of 1924, a small 1/8 page advertisement in Q.S.T. invited readers to send for a copy of the new E. F. Johnson Company Ham Catalog. Ed Johnson (9ALD in those days) had founded the company a year earlier, and with this small ad was just beginning 30 years of advertising in Q.S.T. and over 30 years of service to the radio amateur. His message below, written for this occasion, credits the radio amateur in large measure with the growth of the E. F. Johnson Company to its present position in the electronics industry.

E. F. JOHNSON COMPANY
OFFICE OF THE PRESIDENT

This is an opportune time to express my gratitude to amateurs throughout the world for their loyal support over more than 30 years. This company started out to serve radio amateurs and experimenters. When we made products that satisfied amateurs, who are always discriminating buyers, we knew we had done a good job. As proof that we have succeeded, many of the earliest Johnson products are still considered "modern", and are enjoying widespread usage throughout the electronics industry today.

Our policy has always been to provide functional designs - sturdy, efficient, dependable, and reasonably priced. We pledge a continuation of this policy in the years ahead.

Interesting new products for amateurs and for the commercial and military electronics industry are under development in our engineering laboratories. We are confident they will meet the challenge of your appraisal as in the past. Many of them will be announced in the pages of Q.S.T. Watch for them.

Sincerely,

E. F. JOHNSON

E F Johnson

MANUFACTURERS OF RADIO ELECTRONIC PRODUCTS

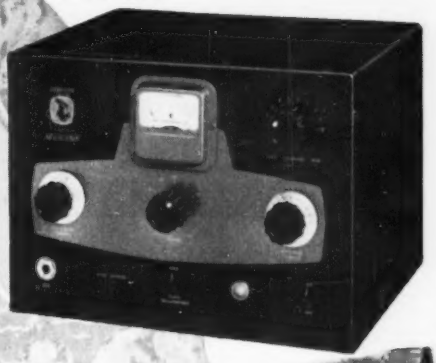
E. F. JOHNSON COMPANY

250 SECOND AVENUE SOUTHWEST • WASECA, MINNESOTA

CAPACITORS • INDUCTORS • SOCKETS • INSULATORS • PLUGS • JACKS • SENDERS • DIALS • PILOT LIGHTS

NEW

WORK 'ROUND THE WORLD*
with the
Viking ADVENTURER
CW TRANSMITTER KIT



TUBE LINE-UP
- 6AG7 Oscillator • 5U4G Rectifier
- 807 Transmitting Type Power Amplifier

TVI SUPPRESSION FEATURES
- Completely shielded cabinet
- Coax-type output connector
- Inductance-capacity type filters on A.C. and key leads
- Low inductance by-passing of meter and filament connections

- **Power input—50 watts** • **Effectively TVI suppressed**
- **Pi-network output tuning—no antenna tuner needed**
- **Bandswitching on 80, 40, 20, 15, 11 and 10 meters**

Loaded with features, the new 50 watt Viking "Adventurer" is the perfect CW transmitter kit for both novice and experienced amateur. Completely self-contained, single-knob bandswitching, and effectively TVI suppressed, the "Adventurer" operates by either crystal or external VFO control. A power receptacle on the rear apron provides for the operation of auxiliary equipment such as a VFO or signal monitor from the transmitter power supply, or for plugging in a modulator for phone operation. This receptacle is wired to permit using the full 450 VDC at 150 ma. and 6.3 VAC at 2 amp. output of the supply to power other equipment when the transmitter is not operating. Power supply is fused for protection from overload damage.

The "Adventurer" needs no antenna tuner because its pi-network output tank circuit will match antennas from 50 to 600 ohms and is capable of tuning out large amounts of reactance. Front panel meter switching monitors final grid or plate currents—clean and crisp break-in keying is accomplished by breaking both oscillator and final amplifier circuits simultaneously.

Extremely compact, only 7 3/8" high x 10 1/8" wide x 8 1/8" deep, the "Adventurer" is designed throughout for easy assembly by the novice or experienced amateur. Wire, punched chassis, all parts, hardware, and connectors furnished. Complete step-by-step assembly directions, pictorial diagrams, and operating instructions included.

Cat. No. 240-181-1 Viking "Adventurer" Kit, *with tubes*, less crystals, and key. *Sold only through Radio Parts Distributors—Available about Dec. 1.* **$54.95**
Amateur Net

*In field tests, the "Adventurer" worked all six continents during one week end of operation.

E. F. JOHNSON COMPANY
250 SECOND AVENUE SOUTHWEST • WASECA, MINNESOTA

CAPACITORS • INDUCTORS • SOCKETS • INSULATORS • PLUGS • JACKS • KNOBS • DIALS • PILOT LIGHTS

(*Continued from page 82*)

N. J. Net members may obtain a packet of 11 maps covering the area from Maine to Chicago and south to South Carolina by sending 25 cents to cover the cost of mailing to ZOL. These maps were furnished Dick by the Socony-Vacuum Oil Co. for distribution to amateurs to facilitate traffic-handlers in locating various towns, etc. Mark your calendar for May 21, 1955, when the RARA Hamfest will be held at Dowd Post, American Legion. ABC and AQY visited UTH with ECM dropping in for a chat. UNF and SJV also visited UTH and attended the RARA picnic at which Director 3YA was present. The NYS picnic held at Bangley Park was well represented by members from Western New York. SJV visited League Headquarters and various hams en route. A few lines regarding traffic-handling: Amateur radio's respect and public relations depend heavily on the traffic-handling ability of the amateur as well as emergency work. Regarding this 3ECP writes, "While traffic-handling is only part of all amateur activity in the U.S.A., the fact is that the only reason we are permitted to exist as such is our potentiality for service in emergencies, and that boils down to traffic-handling." Bear in mind, your messages should be cleared in 48 hours, traffic should be sent to the station nearest destination for delivery NOT to the station nearest the transmitting station to build up a score. All stations are invited to send monthly reports to ye SCM. The RAWNY picnic held at Ellicott Creek Park was a gala affair. HDQ visited the Ft. Stanwick ARA. The Club purchased a Viking II. K2GQF and MSM are now Gen. Class. Appointments: ZZG as EC for Montgomery Co., TVO as EC for Cayuga Co. UTH is working out FB on 2 meters from new hilltop QTH. New officers of the RARA v.h.f. group are UXP, VVG, and K2CEH. UXP transmits bulletins for the group on 145.350 Mc. at 9 P.M. Mon. ZRC renewed ORS appointment. Traffic: (Aug.) W2RUF 239, BNC 238, ZRC 171, K2DSR 158, DXV 146, W2QHH 136, K2BZC 104, W2HKA 92, OZR 63, SJV 44, RUT 40, OE 39, COU 16, K2CUQ 7, BFX 2. (July) W2OE 60, D8S 46, K2BZC 23.

WESTERN PENNSYLVANIA — SCM, R. M. Heck, W3NCD — SEC: GEG. RMs: UHN, NUG, GEG. PAM: LXE, AER. From Emporium way, HX and his XYL, TYC, mobiled in New York, New Jersey, and Pennsylvania during vacation. TYC now is 3rd district chairman of the YLRL and works some YLRL 'phone nets. ZHM is a new Technician Class licensee in Emporium. WN3ZKY, a new call, is held by John Ayers. YUG, another new call in Emporium, is held by Harold Goodman, ex-2QLR. From Washington County SUK finally made solid contact with a Cleve-

(*Continued on page 90*)

PENNSYLVANIA COUNTY QSO CONTEST

The Western Pennsylvania Amateur Radio Club Council, in order to develop better understanding and closer acquaintance and to promote intercounty communications for civil defense and emergency communications between all amateurs, is pleased to sponsor a state-wide Pennsylvania County QSO Contest. All Pennsylvania amateurs and any amateurs who formerly held licenses in Pennsylvania are eligible to take part.

Rules: 1) The contest will begin at 12:01 A.M. EST November 15th and end at midnight December 14th. 2) The object is to QSO as many Pennsylvania stations in as many different counties as possible. Only one contact with a given station may be counted unless the station moves to a different county. 3) Any and all amateur bands and any mode of transmission may be used. 4) A contact shall consist of the two-way exchange of signal reports and county names. Former residents of Pennsylvania will also give the call held and county location when in Pennsylvania. 5) Multiply the number of QSOs by the number of Pennsylvania counties worked for final score. 6) Valid contest entries must list all stations worked together with their county locations. In the case of an ex-resident, the former call and county must be shown. 7) Logs should be submitted to the Western Pennsylvania Amateur Radio Club Council through the W. Pa. SCM (address on page 6), and must be postmarked not later than January 15, 1955. 8) Awards, consisting of engraved 24-hour clocks, will be made to the highest-scoring station in the State, and to the highest-scoring stations in each of the Pennsylvania ARRL sections, except that the highest scorer in the State will not be eligible for either section award. 9) The contest will be judged by the Council, and its decisions will be final. In the case of tie scores, the entry with the earliest postmark will receive preference.

Here's a golden chance to meet the gang around the State. Why not get on the air during the contest period and see how many of them you can work!

Coming Soon... a Real Pro!

A completely NEW receiver, the Pro-310 will be ready for release next month. Wait 'til you see it! Its NEW Cabinet has the design of a custom-built professional rig. But, as is true with all Hammarlund products, it's what's inside the case that's important. Some of its outstanding features are:

- **All frequencies can be read to 1 part in 5000**... Bandspread is continuously calibrated over the entire range from 550 KC to 35.5 MC, not just over a couple of selected bands as in most ordinary receivers.
- **Single Sideband Operation is yours**... because exalted BFO and sharp selectivity are built-in.
- **Exceptional Stability.**
- **High Image Rejection**... on all 6 bands. Double conversion on the top 4 bands
- **Other completely new design features**... including rugged turret: modern etched and plated circuits in the RF section; sectionalized construction; and restful wrist-high controls. **Price . . . $495.00**

Your dealer will be glad to show you the NEW Pro-310 as soon as his stock comes in. In the meantime, we'll be glad to send you a preview. Write to The Hammarlund Manufacturing Co., Inc., 460 W. 34th St., New York 1, N. Y. Ask for Bulletin R-110.

HAMMARLUND
SINCE 1910

MATCHMASTER

Models 650 and 651

A Dummy Load, R-F Watt Meter, SWR Bridge, All in One

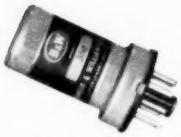
Here's the instrument you asked for. And once you've tried it, you'll wonder how you ever got along without it. It provides, in one completely self-contained cabinet, 6" x 8" x 8",—

A Dummy Load—for all kinds of tests on your transmitter without putting a signal on the air. Maximum SWR 1 to 1.2 over a frequency range of 300kc to 30mc.

A Direct-Reading R-F Watt Meter—for precise adjustments of all r-f stages up to 125 watts, and even higher powers by sampling. Excellent repeat accuracy over full 125 watt scale.

Integral SWR Bridge—for matching antennas and other loads to your transmitter, giving you precise adjustment of beam antennas, antenna tuning networks, and mobile whip antennas.

Controls — including a 3-position function switch, and a meter adjusting knob—are conveniently grouped on the attractive, silk-screen-gray front panel, which also contains a 3-inch calibrated meter, and Type SO239 input and output connections. The ventilated steel cabinet is finished in attractive blue Hammertone. Two types are available;
Model 650: 52-ohm line–Model 651: 73-ohm line
For details, write for descriptive Bulletin 650.



AUDIO PHASE SHIFT NETWORK

Type 2Q4—Model 350

This octal based, audio phase shift network provides a constant 90° phase shift, ± 1.5°, over the audio range of 300 to 3000 cycles, yet requires no more space than a 6J5 tube. Designed especially for single sideband receiving and transmitting applications.

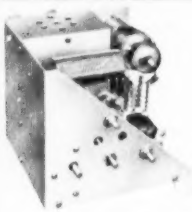
MULTI-POSITION COAXIAL SWITCH

Model 550

Takes The Mess Out of Switching Circuits

At last you can have an inexpensive, multi-position coaxial type switch—for selecting antennas . . . transmitters . . . exciters . . . receivers . . . and other r-f generating devices using 52-75 ohm coaxial line—without fumbling or breaking your back trying to screw and unscrew connections. This B&W Model 550 is equipped with six SO239 type connections for selecting any one of five 52 or 75 ohm lines. It will handle 1kw of modulated power with a maximum crosstalk of —45db at 30mc. Housed in a heavy, 4" diameter aluminum case, the Model 550 is made for single hole mounting.

ON THE



MULTI-BAND FREQUENCY MULTIPLIER

Model 504C

Gives You Any Band At The Flip of a Switch

Here is a newly conceived and designed exciter unit that makes transmission on any band available at the flip of a switch. Compact in its 8" x 7" x 9½" size, the Model 504C covers the 80 through 10 meter bands with a nominal power output of 25 watts from the 807 amplifier stage through a flexible pi-network output circuit. Its broad band type amplifiers require no tuning, and the unit comes equipped with four 6AQ5's that make up its multiplier string. An external VFO or crystal oscillator (80 meter fundamental) is required, as well as a suitable power supply. Sturdily constructed of heavy gauge frosted aluminum, the Model 504C also makes an ideal basic mobile foundation unit for multi-band operation.

PRECISION TOROIDAL TYPE SSB BANDPASS FILTER

Model 360 and 361

Here is a precision bandpass filter valuable for use in heterodyne type sideband generation. Containing eight toroidal type coils in an LC type filter, it is designed to pass the frequencies 16.9 to 20kc. Extreme skirt attenuation. Two types are available: a receiving type (Model 360) for 20,000 ohm input and output; and a universal transmitting or receiving type (Model 361), for 20,000 ohms input and an output of 20,000 ohms unbalanced, plus two 500 ohm balanced outputs. Both types are precision adjusted and housed in hermetically sealed, tinned steel cases measuring 2⅝" x 2¼" x 3¾", exclusive of mounting studs and terminals. Write for Bulletin 360.

BARKER & WILLIAMSON,

AIR WITH B&W

SINGLE SIDEBAND GENERATOR — Model 51SB

For Use With B&W Model 5100 Transmitter

Now, for the first time, you can get really sparkling performance on either SSB, AM phone, or CW. This B&W Single Sideband Generator teamed up with the famous Model 5100 Transmitter gives you outstanding SSB operation on all frequencies provided in the 5100. Tuning and operation are a breeze. No test equipment is required. Single sideband signal is generated by a simple and efficient method perfected after two years of extensive research and testing by B&W engineers. No stone has been left unturned to give you such extras as voice operated and push-to-talk controls, a speaker deactivating circuit, TVI suppression, and unitized construction for quick and easy removal of any major section. Completely self-contained, the 51SB requires no more external accessories than a microphone.

Combine this Single Sideband Generator with the features of your Model 5100—150 watts peak envelope power input (100 watts peak envelope power output) on SSB, 150 watts on CW, 135 watts on AM phone; VFO or crystal operation; pi-network final—and you've got a combination that will flutter the heart of the most critical operator. The 51SB cabinet is made to bolt right onto the 5100 cabinet, extending the 22-inch length to 32 inches. Distinctive panel styling and appointments are the same for both. Easy to install, the 51SB comes factory wired and tested, complete with tubes and all necessary components to convert your Model 5100 Transmitter to SSB. This combination provides a superlative driver for *any* hi-powered linear amplifier.

Write for Bulletin

Inc. 237 Fairfield Avenue
Upper Darby, Pa.

These are just a few of the hundreds of products especially designed and built by B&W to meet the needs of the radio amateur. Others are described in Catalog 2PC available upon request. Write for your copy.

(Continued from page 86)

land, Ohio, station. SUK and VFN attended the WPARCC meeting in Sharon. From Erie attending the SHBP&M Hamfest were LIT, WDK, KNQ, and NCJ (Beth) who won first place in the code-copying contest. Traffic: W3WIQ 1841, LMM 81, UHN 54, SIJ 31, GJY 24, KUN 11, UTR 8, KNQ 6, VKD 3, RVS 1.

CENTRAL DIVISION

ILLINOIS — SCM, George T. Schreiber, W9YIX — Section nets: ILN (3515 kc.), ILN (3940 kc.). SEC: HOA. RMs: BUK, MRQ. PAM: UQT. Asst. EC: VTL. Cook County EC: HPG. A slow-speed section of the ILN (c.w.) was started Sept. 15th at 8:30 P.M. CST. It is hoped the slow-speed section will attract new operators wanting to break into traffic-handling and 'phone men who want to brush up on their code and net procedure. The slow-speed session runs Mon. through Fri. on 3515 kc. CZB is the new EC for Winnebago County. New calls in the AREC are CRH, OKO, GBD, UIK, IUI, DDE, and Novices ECN and IKZ. NIU has plenty of equipment, but would like someone to tell him where to get the time to use it. SKR got his Old Timer's certificate but says he doesn't feel that old. KMO is thinking of giving 2 meters a whirl when he finishes a 40-foot mast in the backyard. IAX is sweating out two more months at 5th Army Hq. before going home to W6-Land. PHE writes he is disturbed at the increasing numbers of W and K stations sneaking outside the bands to work the rare ones. SXL is playing with verticals and trying to cure an intermittent in the final. PEC writes from Korea that he is having his troubles keeping the Marine Corps radio gear on the air. New calls heard are DNL, IOG, CLH, CRI, and Novices GCE, ICW, and BAO. Peoria Area hams MXD, UWC, IOG, DNL, AOP, LIS, FHR, and others were on the air ready to aid the authorities during a two-million-dollar distillery fire there but were not needed. ZJC, TLY, and RYJ, members of Knox County Amateur Radio Club, stood by at a train wreck with their mobile gear until state police straightened out a little trouble with state equipment. VSX and ØEKE handled their traffic. The club call is GFD. PSP/LBB seems to have his RACES organization off to a good start and ready to perk. He has nine stations lined up: GME, ZRF, MZU, APK, APX, GOJ, UFF, GKI, and JNB. LFT, the brother of MRQ, threatens to get on the air now anytime. New calls heard on ILN are OPT, VTO, and WJQ. OQN, editor of the *Oscillator*, the bulletin of the Tri-Town Radio Amateur Club, resumed fall publication with a sparkling issue packed with good operating articles. CYD and LZ, old-timers in the section, have organized an Illinois chapter of the Quarter Century Wireless Operators Assn. Write them if you have held an amateur license for more than 25 years. YLU enjoyed a Mexican trip and worked mobile with a permit from LMRE. DEI is toying with the idea of a vest-pocket beam for 20 meters and CKU is saving his money for a new multi-band vertical. ATH schedules a big pig farmer in Arizona and gets red-hot tips on the market. NN completed contacts with 100 YL operators for the YLCC. He's still moaning about ABS beating him to that VP8. ZOU's mother received her Novice ticket and is found on c.w. using Novice call JCX. GGT lives in a trailer but finds room in the place for a 40-meter rig. PGW spent time in Florida but kept in touch with the home gang via mobile and bragged about the southern-fried chicken. GIC's secret ambition is to home-test every known manufactured receiver and is close to his goal. Contact him for a run-down on your own receiver. Traffic: (Aug.) W9DO 1142, K9FCA 567, W9SME 268, QQG 214, USA 149, IDA 124, MRQ 106, YIX 78, CEE 70, W6CIW/9 42, W9KMO 41, OKI 39, VHD 37, BUK 36, RLK 20, OPT 11, SXL 11, VTO 9, LMC 2, LXJ 2 (July) W9SXL 24.

INDIANA — SCM, George H. Graue, W9BKJ — SEC: LZI. RMs: JUJ, JBQ, WWT, OLX. PAMs: NTA, CMT. July traffic for QIN, as reported by OLX, is 518. August total is 620. WWT reports 115 total traffic for RFN. NTA reports 290 total for IFN. ZSK has dropped the "N" from his call. A newly-formed teen-agers net meets Mon. and Wed. at 1630 on 3910 kc. CEA is Net Manager. The Kokomo Club sponsored a very successful hamfest; TARS likewise, with 163 registrations. PJ2CA won a prize for coming the greatest distance. JUJ and BJZ won the mobile prizes. The Henry County Mobile Net meets each Tue. at 2030 on 29,620 kc. N9IMA is sweating it out. NTI has 29-Mc. mobile. MBL and PPD have 2nd-class tickets. NDH won a Viking VFO at the IRCC Hamfest. MARC mobile held a fox hunt on 29 Mc. with LVS the winner. MYI was the winner of the second hunt. RKE met Tex Beneke, 2CKD, and his XYL, 2EHR, back stage and had a nice long visit. A novel hunt is planned by MARC mobile where the XYLs are the navigators. NZZ, JBQ, TT, and JUJ made BPL this month. Quoting DHJ, to find the QIN net frequency look for the testing frequency of most hams on 80 meters. EHE is new in Valparaiso. NTA finally cut the Wisteria Vine from his mast and says his signals can now be heard statewide. QR put up another antenna. YHA is off to the Navy for three years. GZQ is working on a resonator at Purdue. QYQ is in the hospital in Louisville, Ky.

(Continued on page 98)

New Heathkit VFO KIT

MODEL VF-1

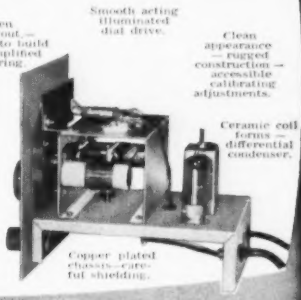
$19.50

Ship. Wt. 7 lbs.

- Smooth acting illuminated and precalibrated dial.
- 6AU6 electron coupled Clapp oscillator and OA2 voltage regulator.
- 7 Band coverage, 160 through 10 meters—10 Volt RF output.
- Copper plated chassis—aluminum cabinet—easy to build—direct keying.

Here is the new Heathkit VFO you have been waiting for. The perfect companion to the Heathkit Model AT-1 Transmitter. It has sufficient output to drive any multi-stage transmitter of modern design. A terrific combination of outstanding features at a low kit price. Good mechanical and electrical design insures operating stability. Coils are wound on heavy duty ceramic forms, using Litz or double cellulose wire coated with polystyrene cement. Variable capacitor is of differential type construction, especially designed for maximum bandspread and features ceramic insulation and double bearings.

This kit is furnished with a carefully precalibrated dial which provides well over two feet of calibrated dial scale. Smooth acting vernier reduction drive insures easy tuning and zero beating. Power requirements 6.3 volts AC at .45 amperes and 250 volts DC at 15 mills. Just plug it into the power receptacle provided on the rear of the AT-1 Transmitter Kit. The VFO coaxial output cable terminates in plastic plug to fit standard ¼" crystal holder. Construction is simple and wiring is easy.



Heathkit AMATEUR TRANSMITTER KIT

MODEL AT-1

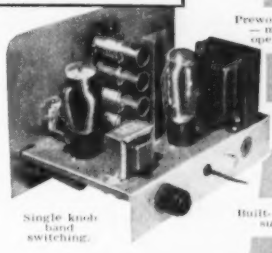
$29.50

Ship. Wt. 16 lbs.

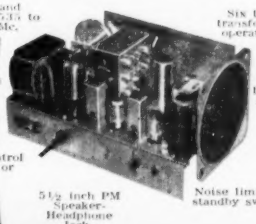
SPECIFICATIONS:

Range 80, 40, 20, 15, 11, 10 meters.
6AG7 ..... Oscillator-multiplier.
6L6 ..... Amplifier-doubler
5U4G ..... Rectifier.
105-125 Volt A.C. 50-60 cycles 100 watts. Size: 8⅛ inch high x 13⅛ inch wide x 7 inch deep.

Here is a major Heathkit addition to the Ham radio field, the AT-1 Transmitter Kit, incorporaring many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, stand-by switch, key click filter, A. C. line filtering, good shielding, etc. VFO or crystal excitation—up to 35 watts input. Built-in power supply provides 425 volts at 100 MA. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis, and detailed construction manual.



NEW Heathkit COMMUNICATIONS RECEIVER KIT



SPECIFICATIONS:

Range ..... 535 Kc to 35 Mc
12BE6 ..... Mixer-oscillator
12BA6 ..... I. F. Amplifier
12AV6 Detector—AVC—audio
12BA6 ..... R. F. O. oscillator
12A6 ..... Beam power output
5Y3GT ..... Rectifier
105-125 volts A.C. 50-60 cycles, 45 watts.

A new Heathkit AR-2 communications receiver. The ideal companion piece for the AT-1 Transmitter. Electrical bandspread scale for tuning and logging convenience. High gain miniature tubes and IF transformers for high sensitivity and good signal to noise ratio. Construct your own Communications Receiver at a very substantial saving. Supplied with all tubes, punched and formed sheet metal parts, speaker, circuit components, and detailed step-by-step construction manual.

MODEL AR-2

$25.50

Ship. Wt. 12 lbs.

CABINET:

Presdylin impregnated fabric covered plywood cabinet. Shipg. weight 5 lbs. Number 91-10, $4.50.

HEATH COMPANY

BENTON HARBOR 9, MICHIGAN

SYM is working out daily on 50.6 Mc. BKR, DKR, HKR, JKR, and OKR are members of the Kokomo Club. The MARC purchased a Viking Ranger. NH still is trying for an all-band antenna. AJA is new editor of *Short Skip*, relieving MVZ. The LCARC purchased a code machine for its classes. WWI received his General Class ticket. BFW is on regularly at Tipton. HXR is trying for a 20-w.p.m. sticker. BYS is building a 500-watt rig. N9IFZ is new in Washington. DFX passed his General Class exams. Traffic: W9NZZ 1026, JBQ 583, TT 504, JUJ 503, UQP 152, DHJ 76, VNV 49, ZRP 48, NTA 44, KDV 42, QR 38, CMT 31, DOK 28, YIP 25, QYQ 24, STC 24, SVL 22, WUH 21, MIV 18, EQO 17, FYM 14, TG 13, WBA 13, CC 12, WRO 12, SKP 6, BDP 5, BKJ 4, DGA 4, PPS 4, NH 3, GUX 1. (July) W9STC 39, DHJ 38, ZRP 27, WUH 20, SYM 16, EPZ 10, PPS 5.

WISCONSIN — SCM, Reno W. Goetsch, W9RQM — SEC: OVO. PAMs: ESJ, GMY. RMs: IXA, RTP, UNJ. Nets: BEN, 3950 kc. 6. P.M. daily; WIN, 3625 kc. 6 P.M. daily; WPN, 3950 kc. 12:15 P.M. Mon.-Sat., 0930 Sun. Mobile and c.d. frequency: 29,620 kc. SAA installed prop-pitch motor for his 10-20-meter Highlite beams. Among those working KC4AB (Nevassa Island) were VBZ, KXK, and RQM. WWJ is helping CFT with the QSL Bureau. RQK's 800 watts will get a rest until December while he is at school in the East. RTP's 200-watt final works FB with no TVI. WIR added speech clipper to Viking and is pleased with results from new Windom antenna. By working JZØ. DU, FC, KC4, and LZ, RKP's total goes to 125. SDK has a new Viking II. WZJ now is mobile. AMM is building kw. final. AEM is building new VFO. VKR is dropping OBS temporarily. WTD added a tape recorder to supplement the Viking II and S-76. KXK added a Q5-er to help snare that elusive DX. ZCK built VFO for his 2E26 rig. SCH has his OTC certificate. DYL plans a 200-watt rig. The MSOE Club was addressed by VCH on the ferrite core antenna. JAW is working out FB with his 12-watt maritime mobile. The Manceorad Club meets the 2nd Tue. of each month in its new club house. DSP picked up North Dakota and Nebraska for a total of 14 states on 144 Mc. IUK is active on 144 Mc. WIN operation this season is under the direction of RM IXA, assisted by RTP. MQV will be working the Wisconsin gang from W4-Land. UFX has been appointed State Radio Officer for RACES, while RUF is RO for Milwaukee. NCS for WIN are CXY Mon., KQB Tue., FXA Wed., LSR Thurs., RTP Fri., MCY Sat., IBF Sun. SAA is Net Mgr. for WPN with AJU, CFL, FZC, HEA, HIF, HQJ, PBB, RQK as NCS. N9DVM completed 2-meter rig. Net certificates "WPN" have been issued to AJU, CFL, GMY, HEA, and RQK. WLW has returned to M.I.T. New appointments include AEM as OO, IXA as RM, RQK and FFC as OPSs. The First Wisconsin Intra-state QSO Party has been scheduled for Dec. 12th. Watch for further details. Traffic: (Aug.) W9VBZ 1882, WWJ 550, CXY 486, SAA 117, RQK 86, GMY 37, RTP 36, FFC 31, IXA 30, KWJ 19, LSR 15, YLE 14, KQB 12, WIR 12, OVO 7, RKP 6, SDK 3, VKR 3, AEM 1. (July) W9KWJ 10.

DAKOTA DIVISION

SOUTH DAKOTA — SCM, J. W. Sikorski, WØRRN — Asst. SCMs: Earl Shirley, ØYQR; Martha Shirley, ØZWL. SEC: GCP. RM: SMV. PAMs: NEO, PRL. UYN and RIJ, Rapid City, dropped the "N." UYN is mobile with Elmac and Super Six. TZT, Rapid City, is using AF-67 fixed station and OJQ has upped mobile power to 20 watts. WØCZK/VO1 is looking for South Dakota on 20 meters between 2:30 and 3:30 P.M. CST. The Prairie Dog ARC announces *Who's Who of SoDak Hamdom* is ready to be shipped. Price: $2.75, postpaid. Send orders to Box 257, Vermillion, S. Dak. New calls: NØWLU, Mitchell, and ØVVA, the XYL of NEO, White River. The South Dakota C.W. Net moved to 3640 kc., Mon., Wed., Fri., 1900 CST. Report for the month showed 13 sessions, 74 QNI and traffic of 35. QKV and LBS are attending the School of Mines. TBX has moved to Minneapolis. New officers of the Sioux Falls ARC are SMV, pres.; OOZ, vice-pres.; OOL, secy.; RWE, treas. PHR bought a new home and DES is building a new home. Traffic: WØBLZ 28, SCT 23, SMV 17, MPQ 13, PHR 11, RWE 10, QKV 5, GWS 4, LBS 4, RRN 4.

MINNESOTA — SCM, Charles M. Bove, WØMXC — Asst. SCM: Vince Smythe, ØGGQ. SEC: GTX. Rms: DQL and OMC. PAMs: JIE and UCV. TQQ has received her General Class license and is operating portable on an island near ELY. The St. Paul gang had emergency gear set up at the State Fair at the civil defense booth using the call REA. RHL is busy putting the finishing touches to his Minnesota Kilowatt, consisting of a pair of Eimac 4-250A tubes in push-pull and using a new vacuum variable split-stator condenser. Activities are picking up at the Mankato Radio Club. OJH, Mankato EC, has signed up quite a few AREC members. GTX, your SEC, has done a terrific job of organizing the emergency set-up in the State. Please coöperate with him. If you have no EC in your county drop George a card at P. O. Box 8, Alexandria, Minn. KJZ recently spent two weeks in the hospital. SII signed up for

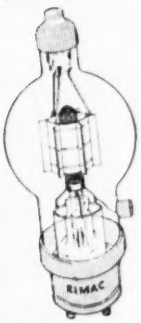
(*Continued on page 94*)

AD #1: QST NOVEMBER 1934

EIMAC 150-T The Tube You Asked For Is Here At Last!

IN EVERY IMPORTANT FEATURE—

UNSURPASSED



HERE is a tube, new and **original** in design. It fulfills the most severe requirements of amateur practice. High output is obtained with low grid driving power and low plate voltages. Exceptionally high vacuum increases **usable** filament emission and prolongs tube life. Tantalum grid and plate construction permits maintenance of high vacuum even when overloaded. Extremely low inter-electrode capacities make for high efficiency at high frequencies. Isolated grid and plate leads, in conjunction with elimination of internal insulators, insure freedom from arc-over or breakdown. Low voltage double-V filament reduces hum, increases filament-ruggedness and life and increases mutual conductance. The large NONEX envelope, free from discoloration, allows maximum heat radiation without bulky physical dimensions. Improved 50-watt base insures rigidity and freedom from short-circuiting. "Ghost" grid structure minimizes electronic shadowing effects on the plate.

Characteristics:
EIMAC-150-T Triode

Fil. Voltage 5 V.; Fil. Current 10 A.; Rated Plate Dissipation 150 W.; Amp. Factor 13; Max. Plate Current 700 MA.

Plate Voltage	1000	2000	3000
Plate Resistance	2750	1900	1250
Mutual Conductance	5800	7300	1200
Normal Power Output (75% eff.)	150W.	300W.	450W.

PRICE $24.50. Sold Only by Reputable Dealers.

More POWER per dollar! Fewer dollars per hour of useful life! The result of six years' experience exclusively building transmitting tubes for ship, mobile, portable and amateur use. Unconditionally guaranteed to be gas-free, and against mechanical defects for two years.

"COMPARE AND REFLECT"

EITEL-McCULLOUGH, INC.
San Bruno, California, U. S. A.

The story behind this first EIMAC ad of twenty years ago

In November, 1934, the above advertisement introduced Eimac tubes to the amateur radio world. In those days, keeping a rig on-the-air wasn't easy. In fact, because it was just plain frustrating, this first Eimac ad came about. Bill Eitel, W6UF, and Jack McCullough, W6CHE, like thousands of other enthusiastic hams, were dissatisfied with the short life, lack of dependability and performance of electron-power vacuum tubes of the day. Rather than live with the problem, they decided to do something about it. In short they made a power triode without troublesome internal insulators, used metals with low gas absorbing capacities as electrodes and perfected thorough pumping techniques. The tube, designed specifically for the amateur radio operator, was called the 150T. What has happened since then has made Eimac the largest manufacturer of transmitting tubes in the world. Eimac triodes, tetrodes, pentodes and klystrons have been continuously specified for all types of commercial and military service. But the amateur radio operator has not been forgotten. Month after month since the first Eimac ad, you have been kept informed about Eimac tube developments and applications. Today, with 69 amateur radio operators in the organization, including W6UF and W6CHE, president and vice president-treasurer, respectively, Eimac illustrates the importance of the amateur to electronic progress.

Eimac

EITEL-McCULLOUGH, INC. SAN BRUNO CALIFORNIA
The World's Largest Manufacturers of Transmitting Tubes

another four years in AFB in Florida. OSZ now is DL4JA in Germany. URQ wired up a Viking II in 15 hours. GYH is building a Novice rig for IXR. A v.h.f.-u.h.f. banquet was held in Willernie, Minn. attended by 25 hams, three from Wisconsin. The main speaker was the chief planning coördinator of civil defense for Minnesota. HPS, MVP, OFY, and OFZ have a daily sked on 220 Mc. every evening from 1900 to 2130 P.M. 6DMJ/Ø and JHS have 432-Mc. gear built. In the Twin Cities there are about 20 stations active on 144 Mc. with operation nightly about 2100 to 2200 P.M. 9LEE beams the bulletins into this area from 1955 until 2100. OJH is a new OBS appointee. OPA is no longer alone at White Bear. There now are 27 hams residing in his area. IRD and IRJ attended the St. Paul Radio Club picnic. The Viking Council of Boy Scouts have a code class in operation with VEP, WRL, and VES doing the instructing. To date twelve of them have Novice licenses. They are now planning a 500-watt unit for their control station. OJH is planning a 500-watt rig using an 813. Active Novices in Mankato are WNØVBD, UTY, TOK, UKY, and RNY. Traffic: WØKLG 152, KFN 99, HUX 44, IKJ 36, KJZ 35, KNR 32, LST 32, LUX 27, OJH 24, UAN 24, MBD 22, MXC 22, BPI 20, BUO 19, TKX 19, CID 16, QZK 12, RNV 12, GGQ 11, LIG 11, WMA 11, GTX 9, BZG 8, EYW 7, HAH 7, KCJ 7, TQQ 7, PUO 6, RA 2.

DELTA DIVISION

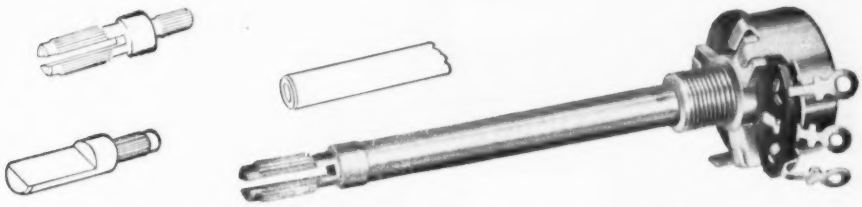
ARKANSAS — SCM, Fred Ward, W5LUX — There was a slight delay in our election of a new SCM for Arkansas, but this will be corrected soon. In the meantime we will carry on here. There is a very little or no activity in Arkansas, if you go by the reports. Boys, let's turn over a new leaf and let the new SCM have a report each month with a little dope about our activities. The Springdale Club is getting well organized now, and HTX is a new OO there. HTX is using a Viking II and an HQ-140X. The hamfest at Little Rock was the best in a long time. On Saturday night we had films and a weiner roast. Sunday was the best with a picnic at Boyle Park. Several carried away some nice prizes. TNM has renewed appointment as EC for Washington County and has OQS and TTG as assistants in Fayetteville and Springdale.

LOUISIANA — SCM, Thomas J. Morgavi, W5FMO — SEC: IUG. PAM: HEJ. RM: NG. Thanks for the fine return of station activities reports. Just keep it up. The Deep South Mobile Club has been formed in the Baton Rouge Area, with a total of 22 members operating on the official club frequency of 3805 kc. Weekly get-togethers include transmitter hunts, picnics at False River and Ponchatoula, trips to Gulfport, Jackson, Miss., and Alexandria hamfests and the "Week End in Old New Orleans." Any mobiles traveling through the Baton Rouge Area are invited to fire up on 3805 kc. While banging away at this copy, I am listening to LVG on 75 meters. He was laid up at a hospital for a spell but he is back in business. DOQ passed his General Class exam. So did DUU. NG is back in stride after an illness. SQI migrated from New Mexico and now is at Bossier City. He is ORS and OPS. MXQ is enjoying that Viking II, a gift from the N.E. Miss. Radio Club. YCO, Shreveport EC, is in the process of organizing an AREC net. GXO is a new OO. There still are many openings for those interested in appointments. Requests for applications for ORS, OPS, OES, and OO appointments are solicited. Help your EC by registering in your local emergency net. All appointees are requested to forward their reports so that data can be sent to Headquarters in ample time. Traffic: W5NG 262, KRX 70, MXQ 38, SQI 21, FMO 19, NLK 4, YCO 3.

TENNESSEE — SCM, Harry C. Simpson, W4SCF — SEC: RRV. PAM: PEP. RM: WQW. The Tennessee C.W. Net opened Labor Day with a bang — 20 stations QNIed the first session. DZK's initials are C. Q. VQE is attending Northwestern, AQI is at U. T. Med. School, ONX at Georgia Tech, TGT is back at Tenn. Tech. WQT reports the S.S.B. Traffic Net now operates Mon. nights at 9 CST on 3980 kc. GEN has never missed a meeting of the Clarksville Club. CVM built a 6-meter rig for c.d., and has been on s.s.b. so long he had trouble with modulators. WQT sent a nice report on activities in the Clarksville Area, as did VUA from the Kingsport Area. Your SCM welcomes such letters. Please keep up the good work. HKU can move his Bandmaster from house to car, and operate mobile, in two and one-half minutes! He also has a new kw. final. Congrats to VDN on the new General Class ticket. VFL is building an 8-foot radio-controlled model plane. UVU cracked up his RC model into the side of a hangar at Sparta Airport. VFL, BEV, 9QBB, and his XYL visited VUA and his XYL. LRO, tired of chasing DX, is grinding new lens for a 'scope. PL reports being visited by BAQ and his XYL, UDI, also ICF. SCF visited the Knoxville-Oak Ridge gang, and had midnight coffee with AY, AEE, and PRY in Nashville, morning coffee with Tim and Helen in Shelbyville, and lunch with PFP in three towns! Traffic: (Aug.) W4PL 2225, VKE 702, OGG 525, TYU 257, HB 136, PFP 125, BQG 117, WQW 70, SCF 57, TZD 50, CXY 28, HHH 27, VUA 26, ZJY 21, BMI 17, RMJ 12, UVS 12, YMB 12, AKB 11, RET 9, BBD 6, FLW 6, PVD 6, RRV 6, TUO 6, VJ 6, COY 4, HEZ 2, PHW 2, UOA 1. (July) W4PL 480.

(*Continued on page 96*)

MALLORY HAM BULLETIN



Designed And Constructed For Maximum Usefulness To The Amateur . . . The Mallory Midgetrol*

There is no question but what the physical size of a volume control, as well as the length, diameter and contour of its shaft, determine to a great extent its usefulness to the amateur for building new radio equipment or repairing old.

Mallory engineers very definitely recognized the importance of these factors when they designed the Mallory Midgetrol series $^{15}/_{16}$" diameter carbon controls, for these controls were designed specifically for maximum usefulness to the amateur (and for that matter, to the industrial or professional radio service user as well).

Practical imagination plus good old-fashioned engineering ingenuity went into the Midgetrol to give you a versatile control whose physical size ($^{15}/_{16}$" in diameter) is small enough to fit the most miniature portable equipment, yet whose electrical characteristics make it entirely suitable for the largest communications set.

Far-sighted engineering has also given you a sensible, *permanently fixed, plain round brass shaft*, which may be altered quickly and effectively to accommodate standard "split-knurl" or "flatted" type knobs without sacrificing the highly desirable advantage of a stable, permanently fixed shaft. (Every round shaft Midgetrol is delivered complete with two unique steel "shaft-ends" which may be pressed permanently into the brass control shaft to accept common knob styles. No filing or unusual handling of the control shaft is required.)

In addition, the unique Midgetrol design has virtually licked the old and annoying problem of unsatisfactory AC switch installation, for an ingenious arrangement for locking the switch permanently and solidly into place has eliminated forever the annoyance of having to remove the control housing to attach the switch. Actually, a switch can be attached to a Midgetrol in much less time than it takes to tell about it.

When you go to see the Midgetrol at your Mallory Distributor's, don't expect a flashy, spectacular volume control, for the Midgetrol was not designed to be that kind of control. Instead, you're going to see a sensible control, designed to do the things a good volume control should do, and yet be as universal as possible without sacrificing a thing in good engineering fundamentals.

Frankly, we're extremely enthusiastic about the possibilities this round shaft Midgetrol has for amateur work, and we think you will be too, when you see it.

*Midgetrol—Trade Mark

P. R. MALLORY & CO., Inc.
INDIANAPOLIS 6 INDIANA

P.R.MALLORY & CO.Inc.
MALLORY

GREAT LAKES DIVISION

KENTUCKY — SCM, Robert E. Fields, W4SBI — WNH, secretary of the HCARO (Hardin County Amateur Radio Organization), says that the members really are getting behind their club. They also want to become affiliated with ARRL and have just held an election in which the following were elected: 9MEU/4, pres.; WN4HJQ, vice-pres.; and WNH, secy. NBY is getting the ECs, too, with AZQ, DJJ, and YZF. WXL has been stepping up his traffic as well as getting a BC 458 on 40 meters. ZLK is meeting the 9RN again. SYD feels that with the summer slump over now the traffic will begin to roll. KKG has a new dual 15- and 20-meter beam and hopes to work some DX. KKW, the RM, really is doing a fine job with the c.w. boys and girls. VHU, our PAM, says that the 'phone net is coming along nicely, too. OMW, as OO, is helping to keep some of the boys in line. CDA says, "Ever since I got my ticket back in 1930 there was never a mike in the shack. There's one here now." YFV has a new mobile rig running 35 watts. PRT, secretary of the Blue Grass Radio Club, says the boys in Lexington are going all the way for amateur radio and club work. Traffic: K4FBW 203, W4WXL 138, VBA 62, SBI 50, WNH 46, ZLK 36, SYD 34, JCN 30, KKG 18, KKW 16, OMW 12, AZQ 8, CDA 6, YFV 5, JUI 4.

MICHIGAN — SCM, Fabian T. McAllister, W8IHKT — Asst. SCMs: Joe Beljan, 8SCW (c.w.); Bob Cooper, 8AQA ('phone). SEC: GJH. By this time you should have received your "order blanks" for the 1955 ham auto license plates. Remember that Dec. 1st is the deadline for ordering them; so if you haven't sent in your request for plates the time to do it is NOW! That brings up a point, too; it has been mentioned before, but it bears repeating now and then. Treat that license plate as something "special." Let the motoring public know that your car observes the rules and courtesies of the road at all times; don't fail to stop and render all possible assistance to any driver in distress. Let pedestrians remember your car as one which gives them the breaks at intersections; one that stops at school-crossings; one that is always on the alert. Let the local authorities know that your car can be depended upon to observe traffic regulations at all times. It is strictly a matter of good public relations; let the public SEE what hams are like. Traffic totals this month look like the regular traffic men are going all out to win a BPL medallion. By the time this is in print the fall traffic nets will have a good shake-down, and should be operating smoothly. Perhaps you don't care for traffic handling; but whether you operate 'phone or c.w., make it a point to check into the net of your choice now and then just to keep in touch with the traffic system. Some day you may NEED the facilities the nets have to offer. RJC comes through for his usual place in BPL. ELW is suffering from the lack of antenna support at the far end; it seems that lightning wanted that tree! IQJ, of the Mount Pleasant Club, is now operating at K4WAR. PHA has returned from summer camp and is on regularly again. TBP likes his mobile, and finally is glad that he taught the XYL to drive! Hard luck tale-of-the-month: MGQ has worked hard for three years to get a 220-volt line to his third-floor shack and now the folks are selling the house! The Mount Pleasant Club exhibit was one of the attractions at the Isabella County Fair; and the members broke out their red shirts with white call letters for the first time. The Berrien County boys assisted the sheriff over the Labor Day week end, by placing ten mobile-equipped cars and drivers at his disposal. Four fixed stations, plus the mobiles, gave good county-wide coverage. Traffic: (Aug.) W8RJC 709, ELW 537, PHU 378, NOH 272, QAH 250, MLR 246, NUL 243, PHA 232, FX 175, ILP 124, ZLK 106, WXO 66, IV 61, NEK 45, QIX 43, SWG 22, TBP 22, AUD 11, DSE 11, HKT 11, JKX 11, OQH 8, SCW 4, HSG 3. (July) W8QAH 119, DLZ 32, TBP 7, MGQ 5. (June) W8ZGT 561.

OHIO — SCM, John E. Siringer, W8AJW — Asst. SCMs: C. D. Hall, 8PUN ('phone); J. C. Erickson, 8DAE (c.w.); and W. B. Davis, 8JNF (adm.). SEC: UPB. PAM: HUX. RMs: DAE, FYO. New appointees are HUX as OPS and PAM and CJK as ORS. ARO made BPL to gain his initial leg on the BPL medallion. FYO also has made BPL on one occasion since the inception of this new award, while RO has two. AVB is trying a cubical quad on 10 meters. ILC has worked 13 states on 80 meters with two watts! ZAU states that a radio club is being formed at Wright-Patterson Field. RO vacationed at Chippews Lake; hence, his decline in traffic. QYS has obtained a Viking II. On Aug. 21st the Toledo gang held a corn roast which substituted for the monthly transmitter hunt. Several hundred amateurs attended the BSRA (Akron) picnic at Virginia Kendall Park. Prizes were plentiful and a good time was had by all. The Cleveland Wireless group held its picnic at Hinkley and BF and AJW emerged as the horseshoe-pitching champs, thereby qualifying for the prizes donated by JNF. The Cleveland Area Council reports a ground-wave contest on 10 meters is to be held in November and that code practice is conducted every Mon. night at the old County Morgue. On Aug. 13th Carty, our SEC, spoke before a large group on c.d. and AREC work at Steubenville. Amateur representatives traveled as far as 60 miles

(Continued on page 98)

PROVEN PERFORMANCE ON

144-148 MEGACYCLES

FCDA APPROVED

FOR MATCHING FUNDS

MODEL

CD-2

DOUBLE CONVERSION RECEIVER

Designed for Continuous Duty.

27 watt input - 17 watt output

The CD-2 is a combined 2 meter crystal controlled transmitter and double conversion superhetrodyne receiver. It is designed for CD fixed and emergency operations, and is engineered to meet all the rigid specifications of the FCDA. The CD-2 is a rugged, quality constructed unit, dependable for the serious work of CD — ideal for just pleasant QSO-ing on two. Compare these fine outstanding features . . .

- 110 VAC AND 6 VDC OPERATION
- RCVR SENSITIVITY: 0.5 MICROVOLTS
- IMAGE REJECTION: 60 db
- HARMONIC SUPPRESSION: 60 db
- 8 CRYSTAL CHANNELS
- NO MULTIPLIER TUNING REQ: (FACTORY SET)
- 6252/AX9910 P.P. FINAL
- PLATE MODULATED
- ANTENNA INPED.: 32 - 72 OHMS
- PROVISIONS FOR COMPLETE REMOTE CONTROL
- PUSH-TO-TALK OPERATION
- AVAILABLE FOR 6 METERS (CD-6)

A complete resume available on request to CD Division —

SONAR RADIO CORP

3050 WEST 21st ST., B'KLYN, N. Y.

SONAR PRODUCTS ARE SOLD BY

A and F ELECTRO MART
Milwaukee, Wis.

ACK RADIO
Birmingham, Alabama

ADIRONDACK RADIO SUPPLY
Amsterdam, N. Y.

ALLIED RADIO
Chicago, Ill.

ALMO RADIO
Phila, Wilmington, Atlantic City, Camden, Salisbury

ARROW ELECTRONICS
New York City

GEORGE D. BARBEY CO.
Reading, Pottstown, Lebanon, Lancaster, Pa.

BRISTOL RADIO
Bristol, Va.

CONCORD RADIO
New York City, N. Y.

BOB DAVIS
1226 The Alameda
San Jose 26, Calif.

DOW RADIO
Pasadena, Calif.

ELMAR ELECTRONIC SUPPLY CORP.
Oakland, Calif.

EVANS RADIO
Concord, New Hampshire

FT. ORANGE RADIO
Albany, N. Y.

R C and L P HALL
Houston, Galveston, Beaumont, Texas City, Texas

HARVEY RADIO
New York City, N. Y.

HENRY RADIO STORES
Butler, Mo., Los Angeles, Calif.

HUDSON RADIO
New York City
Newark, N. J.

OFFENBACH and REIMUS
San Francisco, Calif.

RADIO EQUIPMENT
Buffalo, Batavia, Niagara Falls, N. Y.

RADIO SHACK CORP.
Boston, Mass.

SPECIALTY DISTRIBUTING
Atlanta, Ga.

J. V. STOUT
Baltimore, Md.

TERMINAL RADIO CORP.
New York City, N. Y.

VALLEY ELECTRONICS
Burbank, Calif.

VAN SICKLE RADIO
Ft. Wayne, Indiana

WORLD RADIO LABS, Inc.
Council Bluffs, Iowa

ZACK RADIO SUPPLY CO.
San Francisco, Calif.
Palo Alto, Calif.

to hear his talk. The *Canton Bulletin* tells us that INU has been appointed secy.-treas., OJW has been appointed to the board of directors; IKM is the new program director; while TND has taken charge of license examinations. JWP is attending Ohio State; JIA now is 3ZHJ, and 2SOZ currently is operating in Canton. The *Fort Hamilton Bulletin* mentions that AAV donated a code practice machine to the Club; QLH is in the USAAF; SMA is now living in Tucson; and the family picnic of Aug. 25th turned out to be rather a refreshing affair with the younger element predominating. The OVARC *Ether Waves* informs us that BRA recently purchased a super antenna farm and that SMC has raised his countries worked total to 117. Toledo *Shack Gossip*, which blankets the section's northwestern area, reports that HUX received her WAOC certificate (only the second one issued); KPJ, reported in *QST* as having been married, is still very much single and beating them off with great success; JKS has completed the Jan. *QST* 813 rig and it really works; the GDEs and FCJs each were blessed with male harmonics; MNR is vacationing in Florida; IJL's XYL received her new call, TBT; OSD, one of the Sycamore Smiths, has departed for Ohio Wesleyan U.; and YKF again is active on 2 meters. Northeastern Ohio's *Ham Flashes* tells us JHB will attend M.I.T.; FAX recently passed away as a result of a coronary attack; EKX is out of the Army and attending Valparaiso Radio School; LBU has enrolled at Rensselaer Poly. as a result of an $800 scholarship; JZG will attend Carnegie Tech.; the Triangle Radio Club of East Liverpool meets at RZ's on the 3rd Fri. of each month; and DXO recently worked his 100th MM station. Traffic: (Aug.) W8ARO 345, FYO 277, REL 194, DG 160, MQQ 151, DAE 143, HNP 119, LHV 116, RO 95, AL 50, IFX 49, ZAU 48, IJH 47, GZ 42, SRF 38, CTZ 28, LMB 23, TLW 16, WE 16, AJW 14, EQN 12, KIH 8, ILC 7, RN 7, ET 6, NQQ 6, BMS 4, HUX 4, PM 4, OPU 3, OQP 3. (July) W8FSM 34, ZAU 27, MGC 4.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Stephen J. Neason, W2ILI — SEC: RTE. RMs: TYC, KBT. PAMs: GDD, JQI, IJG. K2HJX is a new call in Hyde Park and is active on 40 Me. NRY has completed a Panadapter. LEL has a new V.P. beam on 14 Me. and it's working FB. K2EKE (EC Putnam County) has a new Viking Ranger. AIH is building a signal slicer. VPG has eliminated his TVI on 144 Me. by the use of a cavity filter. RTE is the newly-appointed Assistant State Radio Officer for Zone 3. K2BSD has erected a new 14-Me. beam for the purpose of handling long-haul traffic. K2DRV dropped the "N" and is building a new 100-watt final plus a converter for work on 144 Me. Attention ECs: SEC RTE finds it very difficult to prepare his monthly reports because of the small return of Form 5 report cards from the various ECs. Ted is extremely interested in knowing of your activity and your problems and also wants to hear of your suggestions to improve the flow of monthly reports. What say, boys? Let's pitch in and do our part by sending in a suggestion. JYB, after a long period of inactivity, has a new Gonset operating on 144 Me. plus a location in Troy which overlooks five cities. K/KN2GNO has a new modulator plus a crystal-controlled rig on 220 Me. SJV was a recent visitor at ILI. CLL sends his best regards to all the gang. VEP is leaving for W6-Land. Bill was the Asst. Manager of NYSEPN. During the emergency caused by Hurricane Carol NYSEPN was in operation. ILI was NCS with GDD as alternate. Much help was received from IUDF and ANA, also W3s UA and PYF. The most traffic was received from 1KRQ of Westerly, R. I. Traffic: (Aug.) K2BSD 183, BE 77, W2EFU 66, LRW 58, GDD 22, K2EKE 20, W2ILI 20, YXE 19, CFU 16, TYC 6. (July) W2APH 9.

NEW YORK CITY AND LONG ISLAND — SCM, Carleton L. Coleman, W2YBT — Asst. SCM: Harry Dannals, TUK. SEC: ZAI. PAM: JZX. RMs: VNJ, LPJ. Until further notice, please mail all activity reports to the Asst. SCM, 139 East Zoranne Drive, Farmingdale, or telephone Farmingdale 2-4880. Your SCM is very QRL and TUK will write this column for awhile, starting with this issue. Traffic totals soared during the summer months — just like the temperature. JOA and his low power continue to roll up big totals, but Merv has entered N. Y. U. and his activity will taper off. NLI traffic net members will anxiously await his return. BO now is using ground planes on 20 and 40 meters. JZX is active with the YLRL Net on 3900 kc. at 9:30 A.M. the 3rd Thurs. of each month. K2EOR handles G. I. traffic on 14 Me. from home station and ragchews from his service station using a ten-watter. K2DVT made General Class and BPL in the same month. K2DEB is planning 2-meter operation. PF spent a two-week Army training period at Fort Monmouth. AIP snagged Extra Class and K2CRJ made General. HVD is holding code classes for Cub Scouts at East Rockaway and could use some ham assistants. GG is keeping skeds with son, 5ZRA, on 14 Me. K2CJN joins the ever-increasing ranks of 20-meter beam-owners. IAG reports still another increase in Queens AREC 10-meter mobiles. K2DDU has ground plane on 20 meters. OKU plans a half-gallon rig to go with two-element 20-meter short beam. NTB is working on 20-

(*Continued on page 100*)

CHICAGO

hermetically sealed

400 CYCLE

TRANSFORMERS

that meet MIL-T-27:

CLASS B* specifications

*85° Ambient—40° Rise.

POWER TRANSFORMERS (All primaries 105/115/125 V., 380-1000 cycles)

HIGH VOLTAGE A.C. Volts	SECONDARY D.C. Ma.	RECTIFIER FILAMENT Volts	RECTIFIER FILAMENT Amps.	OTHER FILAMENTS Volts	OTHER FILAMENTS Amps.	CATALOG NUMBER
270-0-270	55	5.0	2	6.3 CT	2	4PHC-55
335-0-335	70	5.0	2	6.3 CT	3	4PHC-70
375-0-375	120	5.0	3	6.3 CT	4	4PHC-120
440-0-440	165	5.0	3	6.3	7.5	4PHC-165
				6.3	3	
				6.3	3	
				6.3	0.6	
450-0-450	200	5.0	2	6.3	4	4PHC-200A
				6.3	4	
				6.3	0.6	
550-370-75-0-75-370-550	300	5.0	6	6.3 CT	5	4PHR-300
				6.3 CT	1	

FILTER REACTORS

INDUCTANCE (henries)	MAXIMUM D.C. Ma.	D.C. RESISTANCE (ohms)	INSULATION VOLTS RMS	CATALOG NUMBER
2.0	55	160	2,500	4RH-255
2.0	70	240	2,500	4RH-270
2.0	120	105	2,500	4RH-2120
2.0	165	80	2,500	4RH-2165
2.0	200	77	2,500	4RH-2200
2.0	300	49	2,500	4RH-2300

FILAMENT TRANSFORMERS (All primaries 105/115/125 V., 380-1000 cycles)

SEC. VOLTS	SEC. AMPS.	INSULATION VOLTS RMS	CATALOG NUMBER
6.3 CT	3	2,500	4FH-63
6.3 CT	5.5	2,500	4FH-65
6.3 CT	10	2,500	4FH-610
6.3 CT	20	2,500	4FH-620

Write for Chicago Bulletin #32 listing more complete specifications on these units, specially designed for 400 cycle, high-temperature operation.

CHICAGO STANDARD TRANSFORMER CORP.

3501 ADDISON STREET • CHICAGO 18, ILLINOIS

meter vertical beam. K2s DOQ, GZE, and HKH made General Class. KN2IYK is building a 35-watter. K2AMP is building frequency meter for Observer work. EEN gave the new Viking Ranger a rest while redecorating the house. DLO is completing 4X150 cavity for 420 Mc. to go with crystal converter for the same band. OGX has new all-band mobile. RWQ soon will be heard with Ranger rig. K2GJR is operating at Chaminade H.S., 2JTZ, using Viking I and SX-71. IVX is active on s.s.b. K2s AMM and BKN are looking for more 220-Mc. activity. Welcome to the newly-formed Republic Radio Club with 100 members. K2HID, using Heathkit AT-1 and VFO, operated from a summer location. K2s CQB, CSD, GBU, and GHS are new members of the New York Radio Club. The Fordham RC is holding an auction for the Braille Technical Press on Friday evening, Nov. 5th, and requests that all interested parties meet at its Bronx Masonic Temple clubhouse. JGV/1 is active on several nets. NJL's XYL is awaiting her Novice call. QBX/3, at State College, Pa., reports he is finishing 144-Mc. mobile. Hurricane Carol alerted the AREC nets of Nassau and Suffolk Counties. Reports still are coming in on this "unrehearsed" preview of the annual Simulated Emergency Test. Amateur radio once again assisted the Red Cross. With the fall season now in full swing, you are invited to participate in the section traffic and emergency nets. All clubs and individuals are urged to send in activity reports to the SCM. See you in the Sweepstakes! Traffic: (Aug.) W2JOA 1108, KFV 990, BO 919, KEB 815, JZX 629, K2EOR 151, DVT 123, ABW 81, DEB 62, W2OMG 37, K2CRH 34, W2OME 32, PF 21, AEE 18, LGK 15, EEY 7, K2CJN 6, CMV 6, W2IAG 5, GPQ 4, K2DDU 2, W2NTB 2, OKU 2. (July) W2BO 917, K2EOR 178, W2TUK 8, NTB 1.

NORTHERN NEW JERSEY — SCM, Lloyd H. Manamon, W2VQR — Asst. SCM: Charles Teeters, K2DHE. SEC: NKD. PAM: CCS. RMs: EAS, NKD, CGG. OO reports were received from NIY, GVZ, and K2BWQ. K2EUN was portable VE3 from Ennismore, Ont., the latter part of August. K2BWP has put up a new three-element 20-meter beam. Walt also has up a new three-element 10-meter beam and a twelve-element 2-meter beam. K2BCK will leave for Norfolk and the U.S.S. *Roanoke* the first of December, but Ted hopes to make the SS amid the packing. LAV, CCY, EWZ, and KN2EEA trained with the Army Reserve at Camp Drum. We are sorry to hear that CJX has been hospitalized. WCZ was elected president of the Ocean County Amateur Radio Assn. Walt presided over the OCARC meeting Aug. 17th at the Beach Haven Yacht Club. KN2GER is now K2GER. CFB is giving 75-meter 'phone a try, but Harry has a little trouble seeing the receiver dial through the smoke from the transmitter. K2IKS is putting on a good show with a new Viking Ranger when on leave from the Army and Fort Dix. Westwood is to be the new home of JHK shortly. GVP is trying to figure a way to move the neighbors' houses to put up a 40-meter beam. K2BAY finally decided that 10-meter c.w. is long gone so has switched to 10-meter 'phone. A teen-agers radio club is being started in the Teaneck-Ridgefield Park Area. Anyone interested should get in touch with K2DOX, K2GBP, or GTK. VQR was the guest speaker at the July meeting of the Fort Monmouth Radio Club, the N. J. RACES plan was the subject. EAS reports that the NJN held its own this summer with 6 sessions every week. BRC is back on the air again after a four-year lay-off, c.w. on all bands. CVW now is a MARS member, which should push the traffic even faster. N.N.J. was represented at the South Jersey Hamfest by IBH, CCY, PWX, FZY, and K2DHE. The Spotswood Radio Club held a hamfest on Sept. 4th. A good turnout heard a talk by IIN on c.d. A special station was set up for the event with the call K2EUN/2. The summer must be over as NIE is back on the air again. It seems that Bergen County activity in RACES picks up in the summer. CVF, the County Radio Officer, reports a high of 152 for the Sept. 1st drill. Ralph reports 142 new RACES licenses in the county for August. K2ICE is having trouble with a little weasel in his Gonset. The Monmouth County 2-meter Net, under the direction of ENM, was set up for action during the hurricane warning on Sept. 10th. An all-night watch on the storm was kept by ENM, OUS, and GSA. The Garden State Club held a hamfest at McGuire's grove Sept. 26th. The section was saddened to learn of the passing of COK. K2EUP attended the hamfest at Spotswood. John reports he has a new rig on the air and is all set for a good season of traffic-handling. HJL is burning up the 144-Mc. band. Traffic: K2BWQ 161, BWP 157, W2EAS 143, K2EUN 111, GAS 109, W2CQB 62, CVW 56, K2DPS 12, EQP 12, IKS 11, BCK 7, CHI 2, W2CJX 2, NIY 2, CFB 1.

MIDWEST DIVISION

IOWA — SCM, William G. Davis, W0PP — WIT now is back in Iowa and active in the organization of a ham club in Ft. Dodge. PP became a granddad for the eighth time. QVA reports that BBZ was married Aug. 16th and will make his home in Long Beach, where he is stationed aboard the *USS Rochester*. Ex-QAO now is in Myrtle Beach, S. C. New Technician Class licensees in Burlington are GCG and MAH.

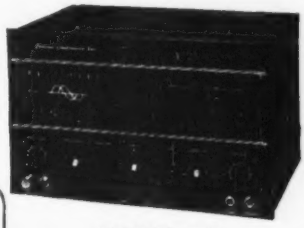
(*Continued on page 102*)

EVERYBODY WANTS
MULTIPHASE EQUIPMENT

and for good reason. It's versatile, permits all-band operation 10 thru 160, it's extremely stable and it's a well engineered, dependable piece of communications equipment.

MODEL 20A

MULTIPHASE EQUIPMENT is the overwhelming choice of SSB OPS everywhere. Ask any ham who uses it! Listen to it perform on SSB, AM, PM or CW!



MODEL 20A

- **20 Watts Peak Output SSB, AM, PM and CW**
- **Completely Bandswitched 160 thru 10 Meters**
- **Magic Eye Carrier Null and Peak Modulation Indicator**

Choice of grey table model, grey or black wrinkle finish rack model.

Wired and tested..... **$249.50**
Complete kit..... **$199.50**

Check These Features
NOW IN BOTH MODELS

- **Perfected Voice-Controlled Break-in on SSB, AM, PM.**
- **Upper or Lower Sideband** at the flip of a switch.
- **New Carrier Level Control.** Insert any amount of carrier without disturbing carrier suppression adjustments.
- **New Calibrate Circuit.** Simply talk yourself exactly on frequency as you set your VFO. Calibrate signal level adjustable from zero to full output.
- **New AF Input Jack.** For oscillator or phone patch.
- **CW Break-in Operation.**
- **New Gold Contact Voice Control Relay.** Extra contacts for muting receiver, operating relays, etc.
- **Accessory Power Socket.** Furnishes blocking bias for linear amplifier and voltage for optional VFO (Modified BC458 makes an excellent multiband VFO.)
- **40 DB or More Suppression** of unwanted sideband.

MODEL 10B
SUCCESSOR TO THE POPULAR MODEL 10A

- **10 Watts Peak Output SSB, AM, PM and CW**
- **Multiband Operation** using plug-in coils.

Choice of grey table model, grey or black wrinkle finish rack model. With coils for one band.

Wired and tested..... **$179.50**
Complete kit..... **$139.50**

SIDEBAND SLICER
MODEL A IMPROVES ANY RECEIVER

Upper or lower sideband reception of SSB, AM, PM and CW at the flip of a switch. Cuts QRM in half. Exalted carrier method eliminates distortion caused by selective fading. Easily connected into any receiver having 450-500 KC IF. Built-in power supply. Reduces or eliminates interference from 15 KC TV receiver sweep harmonics.

Wired and tested..... **$74.50**
Complete kit..... **$49.50**

QT-1 ANTI-TRIP UNIT

Perfected Voice Operated Break-in with loudspeaker. Prevents loud signals, heterodynes and static from tripping the voice break-in circuit. All electronic — no relays. Plugs into socket inside 20A or 10B Exciter.

Wired and tested, with tube.... **$12.50**

AP-1 ADAPTER

Plug-in IF stage — used with Slicer, allows receiver to be switched back to normal.

Wired and tested, with tube..... **$8.50**

PS-1 NETWORK

Plug-in prealigned 90° phase shift network and socket available separately for use with GE Signal Slicer and SSB Jr..... **$8.95**

WRITE FOR LITERATURE

MULTIPHASE EQUIPMENT

Central Electronics, Inc.

1247 W. Belmont Ave. Chicago 13, Illinois

Watch For Early Announcement Of The New DeLuxe MULTIPHASE VFO.

UTG dropped the "N" from his call. ANR has a new Gonset Super Six. LAC vacationed in Minnesota. TQG spent his vacation in New Mexico. KH6BQ vacationed in Burlington, his former home town. QVA is building up a Viking Ranger kit. PUR spent the last of July in Michigan and the first part of August in Yellowstone. YDX, now in Wasecа, Minn., reports that he hopes to be on the air soon. VFM has a 277-ft. antenna and says he's working the DX. WNØSQE holds code practice on 3749 kc. at 4 P.M. Mon. through Fri. at 5, 8, 10, and 13 w.p.m. HST has his Extra Class license and got it the hard way. PAN reports that now he has his modulator going, antenna and TVI problems have cropped up. With vacations taking BDR, KHQ, RTA, and 9UJ away, SCA was left with most of the TCC work. BDR and SCA qualify for one of the new ARRL medallions. Traffic: (Aug.) WØSCA 1201, BDR 708, CZ 200, LJW 39, QVA 14, PUR 12, WNØSQE 12, WØBLH 11, NYX 11, NGS 10, PAN 7, WNØTQI 2. (July) WØBDR 671.

KANSAS — SCM, Earl N. Johnston, WØICV — SEC: PAH. PAM: FNS. RM: KXL. The Kansas-Nebraska Hamfest held at Concordia Aug. 15th was well attended. The Tri-Cities Hamfest of Sept. 5th, with a registration of over 220, brought folks from Nebraska, Colorado, Wyoming, Oklahoma and eastern Kansas. RLZ's XYL won a 300-watt Millen final in cabinet and other accessories. New AREC members are WIZ of Emporia, OGY of Goodland, and HCV of Olathe. LBJ is a new OO and OPS. OFR has a new Viking VFO and is working all bands. UAW, age 12, is a new ham in Sabetha and VIT is a new call in Fairview. UAT now has his General Class ticket and his OM is now WMV. PuL also has built a new cathode modulator for his rig. EWV, of Columbus, reports VXC, VVP, and VWQ are new calls there. NFP has a new exciter with bandswitching VFO to be on the air at KU this year. EWV has a new 50 foot mast on his house. QJC, of Topeka, built a new Viking II with VFO. He's also taking a liking to c.w. and no doubt will be one of the QKS boys soon. EOT, of Chanute, is to be congratulated on an unusual record of being present for every session of QKS and QKS 8S — 12 consecutive months. YUQ, of Manhattan, is to be commended on his FB activity as Acting NCS on the Kansas 'Phone net. Traffic: (Aug.) WØBLJ 670, NIY 206, EOT 130, WGM 50, MXG 48, ABJ 38, FDJ 21, SVE 19, TOL 17, DEL 10, PSL 9, ECD 8, KES 7, ICV 6, LHX 6, LOW 5, YFE 5, OFR 4, QMU 4, QGG 3, LQX 1. (July) WØTOL 17.

MISSOURI — SCM, Clarence L. Arundale, WØGBJ — SEC: VRF. PAM: BVL. RMs: OUD, QXO. QBX is assisting in the organization of a Teen-Age Net which meets at 7:00 A.M. on 3830 kc. Those interested should contact QBX for further details. IJS has earned his 2,500 Traffickers Club certificate. IJJ is on an extended trip to the West Coast. OWA is on a tour of the Caribbean, visiting KP4-, CO-, and KV4-Land. PWN, with his 70 watts, has earned WAS and RCC certificates and has worked 28 countries. RTW has received his Conditional Class and RTO and RWT their General Class tickets. BZK is looking for someone interested in 2 meters. ARH has added KC4 and MF2 to his DX list. GAR and QXO had to have power transformers rewound. CPI made BPL before leaving for a two-week vacation trip to the Gulf Coast. KA again is active following recovery from recent surgery. KIK has raised his antenna another twelve feet. TGC has received his General Class ticket and is on with a Viking II and an SX-71. WNØTOS is operating with 14 watts input and works the West Coast. RCV has a new 20-meter antenna. FNN has returned to Springfield and is temporarily inactive. With the return of cooler weather and increased activity, all traffic net operators are urged to report their traffic activities. Traffic: WØGAR 842, QXO 583, CPI 535, GBJ 203, BZK 147, IJS 125, HUI 59, EBE 39, KA 30, KIK 26, OUD 20, QMF 16, RCV 10, QWB 9, CKQ 3, LQC 3, CXE 2, TGC 2, QBX 1.

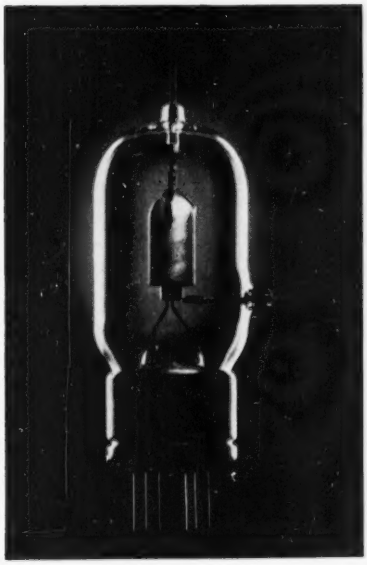
NEBRASKA — SCM, Floyd B. Campbell, WØCBH — Asst. SCM/NCS: Tom Boydston, ØVYX. SEC: JDJ, JDJ and VPR recently went to Omaha to discuss problems and antennas with the Omaha boys. The time for considering the license plates is drawing near so get your ideas gathered up and sent in. YZK now has the mobile bug. NRS has a spinner for his 10-meter beam. WNØGVK is on the air with 4D32 and 50 watts. New calls at North Platte are WNØVEA and WNØUVB. UOW has a 610. ATU is doing things for s.s.b. with 10A and 304TL. WNØSXR, at Sutherland, has 610 and is sweating out his General Class license. Wally is all set with a Windom antenna. YSK was elected president of the newly-formed Norfolk Radio Club. Meetings are held on the second floor of the Administration Bldg. at the Airport. The club station is VNI with a 260-ft. antenna. Meetings are held the 1st and 3rd Wed. NBO is secy.-treas. WNØVGK has 807s in the final and is using an S38. The Nebraska 75-meter 'Phone Net had 78 stations on roll call with 76 reporting in and 28 having traffic reports for the NCS. FQB attended the International Municipal Signal Assn. Convention in Atlantic City. EUT is s.s.b. with a nice signal out this way. RYG was on s.s.b. also with a good signal. The North Platte Net meets Mon. weekly at 7 P.M. with LRK as NCS. KXD has a new 183-D. LRK and CBH have new 20-

(Continued on page 104)

MEDIUM-MU TRIODE
3C24/24G

LOW-COST

VERSATILE



STURDY

TOUGH

DEPENDABLE

LONG-LIVED

LIVING UP TO LOS GATOS SPECIFICATIONS

Like newer tube types of the Los Gatos line, the familiar 3C24/24G works hard to maintain the nine-plus life responsibility that goes with the Los Gatos Brand*.

A well-built triode with tantalum plate acting as a permanent getter during operation, the Los Gatos 3C24 has a 55-watt plate input for unmodulated Class-C r-f amplifier service or a 36-watt plate input for Class-C r-f plate-modulated amplifier service to 300 megacycles.

*Reg. U. S. Patent Office

LEWIS and KAUFMAN, Ltd.

LOS GATOS 4 CALIFORNIA

LOS GATOS LONG LIFE

Export Representatives:
MINTHORNE INTERNATIONAL CO., INC.
15 Moore St., N.Y. 4, N.Y. Cable: Minthorne

In Canada:
THE RADIO VALVE COMPANY OF CANADA, LIMITED
189 DuMoyn Street, Toronto 1, Ontario, Canada

meter beams. Traffic: KØAIR 1936, WØZJF 164, AEM 50, KØWBF 40, WØHTA 23, VYX 23, KDW 17, MAO 15, FQB 10, OFL 10, EGQ 8, QOU 8, CBH 6, QMZ 6, RNH 6, NHS 5, PQP 5, ERM 4, HQN 4, NHT 4, DDP 3, POL 3, QHG 3, QVV 3, DJC 2, HXH 2, IRW 2, LRK 2, PDJ 2, PON 2, RRH 2, UOW 2, BEA 1.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Milton E. Chaffee, W1EFW — SEC: LKF. PAM: RRE. RM: KYQ, MCN and CN, 3640; CPN, 3880; CEN, 29,580; CTN 3640 kc. New ORS: WNH. OPS: YBH. Traffic is picking up on all nets and it looks like a banner year. CTN got underway Sept. 18th and each Sat. on 3640 kc. at 1845. RFJ is NCS, with HYF as alternate, hand keys only. MLT, who handled reports for CPN while RRE was hospitalized, submits his final, showing 100 messages in 25 sessions. K6EJH, ex-RDQ, is back on 20 and 75 meters from West Haven and hopes to regain his old call. RWD proclaims his transition to s.s.b. is now complete and says CFE also has joined the s.s.b. ranks. WNH made BPL on originations plus deliveries but now will be busy with school again. GIX sends in the only OO report and says OBS schedules are being maintained. UJG comes up with the only OES report and has crystal 220-Mc. rig under construction. TD is holding OBS schedule on 146 Mc. NFG mentions he can issue passes for portable operation in East or West Rock Parks, New Haven. TSZ left for school in New York City. TYQ is adding a modulator. The Connecticut Valley 2-meter Net meets Thurs. at 2100. DBM was speaker at the August meeting of SARC on "Frequency Jamming." BSE is a new Novice at Stratford. BGP sticks to low power. RON and TCW spent their vacations rebuilding. Inactivity at FOB caused him to drop EC but not OPS appointment. The CN/CPN picnic held Aug. 8th was attended by BVB, EFW, HYF, RGB, RPQ, TSZ, UNG, VOQ, WNH, WPO, YNC, YYM, 5FQF, and 5JXM. We still need your news items so please keep them coming to reach me by the 5th. Also don't forget to watch for the renewal of your appointments — we can't afford to lose any. NLM renewed ORS and EC appointments and reports a new Eldico TR1 on 20 meters with 300 watts. Hurricane Carol provided heavy traffic for OPZ. UIZ copied 4HHK on 2 meters and plans more trips to Mt. Monadnock, N. H., for v.h.f. and u.h.f. work. Traffic: W5JXM/1 361, W1WNH 318, TSZ 188, YBH 104, KYQ 88, EFW 81 BVB 75, OPZ 66, RGB 53, YYM 51, MLT 42, AW 41, ODW 27, BDI 24, RFJ 22, LV 12, KV 11, HYF 8, GIX 4, BFS 3.

MAINE — SCM, Bernard Seamon, W1AFT — SEC: BYK. PAM: BTY. RM: OHT. The Sea Gull Net meets at 1730 on 3960 kc., the Pine Tree Net at 1900 on 3596 kc., and the Barnyard Net at 0730 on 3960 kc. At 1020 on Aug. 31st BPL in the absence of SEC BYK, alerted the c.d. net. Some 77 stations reported in ready to go to work. Work they did, handling many emergency messages and "are you OK?" traffic. Because of loss of power many of the gang were forced off the air, others continued on with emergency power. The State c.d. control station, FRS, at Augusta was plagued by a balky generator. We commend the Maine gang for a fine piece of work during the hurricane. TVB's XYL now has her own call, YTE. GGQ called on the SCM in his new "Skylark." YIS and the *Blue Dolphin* returned from their Arctic expedition late in August. All aboard were well, but reported a very rough voyage. Everyone had a great time at Stevie's. Once again KDE won the mobile hunt. That makes a clean sweep for Doc of both of the Maine hamfests this year. The Rockland gang put on a lobster picnic Aug. 29th which was well attended. Please send more news to your SCM. Traffic reports were very meager this month because of the hurricane's interruption. Final flash: PTL/M and Ruby are mobiling to Seattle, Wash., for a month's vacation. Traffic: W1LKP 125, BPI 88, YYW 40, AFT 14, BX 12, NXX 10.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — During Hurricane Carol, which hit on Aug. 31st, ZWQ, YYE, and ALP manned IA at the Quincy City Hall, the gang at TYN were on, MB mobile, FVD, WFQ, ZWQ, SH, CQN, and FWS, and we heard the Hingham Radio Club mobiles. BB reported that the Winthrop gang was on and helped the police with communications. We heard PST at VBC lining up a group of operators and equipment to go on a convoy with the Red Cross to New Bedford. On the TCPN we heard SS and a W9/1 at Falmouth. KLC was on 2 and 10 meters looking for Cape stations. WN1BYM and YIZ have Gonsets on 2 meters. RCY and WTK also are on. WN1CAG is LZW's boy. WN1AQJ is JKR's XYL. 7SAB/1 is at the Boston Navy Yard and is a new OES. Sorry to have to report the death of LXQ, of Newburyport. WSN operated 20-meter c.w. mobile up in VE-Land. OAR, who was active on 10 meters, is another "Silent Key." SMO writes from Phoenixville, Pa., and says he is back from Korea. The South Shore Club held a summer meeting. The Braintree Radio Club held a meeting and some of the gang went down to RDV's in Connecticut. LM was off the air for the summer. THO is mobile on 6 meters. The Arlington 6-meter gang had a gypsy ride. VPT is moving to the Police Dept. Bldg.

(Continued on page 106)

Amateurs and Experimenters!

ONE DAY SERVICE!
2000 KC to 54 MC

ONE-DAY Processing

Orders for less than five crystals will be processed and shipped in one day. Orders received on Monday thru Thursday will be shipped the day following receipt of the order. Orders received on Friday will be shipped the following Monday.

International TYPE FA-9
(fits same socket as FT-243)

Pin Spacing .486 Pin Diameter .093

RANGE (kc)	TOLERANCE	PRICE
Fundamental Crystals		
2000-9999	.01%	$2.80
10000-15000	.01%	$3.90
Overtone Crystals (For 3rd overtone operation)		
15 MC- 29.99 MC	.01%	$2.80
30 MC- 54 MC	.01%	$3.90

SPOT FREQUENCY

.01% TOLERANCE—Crystals are all of the plated, hermetically sealed type and calibrated to .01% or better of the specified frequency when operated into a 32 mmf load capacitance.

HOW TO ORDER

In order to give the fastest possible service, crystals are sold direct and are not handled by any jobber. Where cash accompanies the order, International will prepay the Air Mail postage; otherwise, shipment will be made C.O.D. Specify your exact frequency and the crystal will be calibrated to .01% or better of this frequency with the unit operating into a 32 mmf load capacitance.

International Crystal Mfg. Co., Inc. DEPT. Y
18 North Lee
Oklahoma City, Okla.

Price

Please Send: _____Crystals Freq._____ _____
_____Crystals Freq._____ _____
_____Crystals Freq._____ _____
TOTAL $_____

TO: Name:_____
Address:_____
City_____Zone:_____State:_____

Enclosed: ☐ Check, ☐ Cash, ☐ M.O. for $_____, or Ship C.O.D. ☐

International CRYSTAL Mfg. Co., Inc. 18 N. Lee Phone FO 5-1165 OKLAHOMA CITY, OKLA.

WN1ZGL is new in Middleton. WAI is on 75 meters and handling emergency traffic. WU reports things were bad in New Bedford with no power. Among those active on c.d. were WKN, WGN, WU, APN, AGG, MHN, OH, ZHC, AVY, VDF, AEN, and ZPE. AVY reports others helping in New Bedford were LAZ, HPH, TZU, UID, CTZ, BMQ, AWH, OH, Jerry Mullen, and Edgar Collins. HIL still is mobile on 75 meters. VVA has gone to sea as an operator. WN1BOA has a Heathkit AT1 on 40 and 80 meters. NHN says c.d. in Needham is shaping up well. RSY says he is going to reorganize c.d. in his town. RFE says he has 5 hams in his town now and things are looking up for c.d. work. WJZ has moved. BB reports that they have their fifteenth crystal transmitter now, thanks to MQB and WJZ. The last drill they had BB, MQB, NMX, BOX, BDU, VIS, and HFJ on. Appointments endorsed: NME-NID as OBS, UTH as ORS, BB and UTH as OO. Also as EC's: MCR Boston, RSY Bedford, BB Winthrop, SUR Mansfield. ZTI is quite active in Rockland. FEC has a 10-meter Sunday net with the following on: LDZ, KLS, JXF, VED, and FIU, who is Radio Officer and reports in to the Region 6 Net with LJT. CLF also is reporting in to the Region 6 Net in Brockton. UKO made BPL again. QLT is operating from temporary quarters in Woods Hole. TY has no power. Amesbury hams did a nice job during Hurricane Carol. WN1ZOC is on 2 meters. ZNG has his General Class license and lost his antenna in the storm. Traffic: (Aug.) W1UKO 500, UTH 251, VVA 162, UE 140, IBE 121, AVY 80, BB 20, TY 12, ATX 10, WU 10, QLT 9, BY 7, AHP 2, HIL 2, IA 1. (July) W1WAI 19. (June) W1NUP 26.

WESTERN MASSACHUSETTS — SCM, Roger E. Corey, W1JYH — SEC: KUE. RM: BVR. PAM: RDR. WMN meets at 7 P.M. EST, Mon. through Fri. on 3560 kc. VLH gave the HCRC a talk and demonstrated some of the latest v.h.f. gear being built at the ARRL labs. WN1BHC, newest Novice in the section, is the XYL of UBD. RFU was second high national scorer in the June V.H.F. Party. KFV has a new Elmac AF-67 and has been working DX on 20-meter 'phone with it. SRM received his 35-w.p.m. CP sticker and is looking forward to the SS in hopes of getting his 48th state. AJX dropped the "N" from his call recently and is on 80- and 40-meter 'phone and c.w. CLX has a new Telerex beam to help along his ever-growing DX total. MKD, MDJ, and ZEO were alerted during Hurricane Carol. UVI discovered and reported a large fire during a c.d. drill, and with other AREC members was able to assist the fire and police departments. YXV is a new OBS appointee and has been working some good DX on 80- and 40-meter c.w. COI added QSLs from three new 'phone countries and worked YU1GM for a fourth. WCC has a new antenna and is on 75-meter 'phone with the "Simplest Modulator." QWJ has added a low-frequency i.f. strip to his NC-200. OBQ has a new SX-71. JYH finally got up to 210 with a card from OD5AV. MNG has a full kw. on all the low-frequency bands now and can be found in almost any traffic net, contest, or round table. YCG spent the summer working in Pittsfield but is back at Amherst College. Traffic: K1WAB 792, K2CBD/1 220, W1UKR 152, BVR 62, SRM 45, WEF 45, RRV 24, TAY 22, UVI 21, WDW 3, OBQ 1.

NEW HAMPSHIRE — SCM, Carroll A. Currier, W1GMH — SEC: BXU. RM: CRW. Asst. RM: TBS. PAM: AXL. UNV is going to electronic school in the Navy. QHS still is doing a good job at frequency measuring. BFT has started work on the new building for Evans Radio. K2DEM/1 has been very active at Camp Chippee Wawa in Enfield all summer. GMH has a new home, all on one floor, so there will be no more stair-climbing. SGD has a new beam on 10 meters. The Merrimack Valley C.D. Net is well organized and active. The Manchester Radio Club already has given exams as the result of classes conducted by WUU and TXK. 4WPF visited in New Hampshire this summer and was on 10-meter mobile. I am still Acting SCM until the election has been completed. AO sure has a fine mobile rig and can be heard all over New England. UEB has the rig all set up in the new QTH with the able assistance of FOK. Traffic: (Aug.) W1GMH 184, WUU 63, K2DEM/1 20, W1CDX 16, POK 9. (July) K2DEM/1 42.

RHODE ISLAND — SCM, Merrill D. Randall, W1JBB — This month's report usually is the most newsie of the year, for it is in September that we turn from vacation to work, from hammock to easy chair, and from fishing to radio. Usually, there would be the winter schedules to announce and the results of summer experiments to comment on in this column. Not this year — Carol, the capricious, has seen to that! Frankly, at this writing, I do not have any idea how the vast majority of the gang here in Rhode Island made out. My two locations are not as yet back on the air — I have had telephone service for only two days — and the beams and antennas that mark my course to my job have disappeared. In some instances the very homes to which they were attached are gone. It is my prayer that all are well and safe. This may be my last report as SCM. It has been a pleasant and informative two years and one which I will always remember. Traffic: (Aug.) W1TRX 35, W1YAO 12, ZJQ 10. (July) W1YAO 19.

VERMONT — SCM, Robert L. Scott, W1RNA — SEC: SIO. PAM: RPR. RM: OAK. Nets: VTPN, 3860 kc., 0930

(Continued on page 108)

MORROW RECEIVERS

... HIGH IN DEMAND ... HIGH IN QUALITY LOOK TO MORROW FOR HIGH PERFORMANCE!

Skillful engineering, constant research and a sincere desire to give the Radio Amateur the most for his hard earned dollar have always been MORROW considerations when building radio equipment.

MORROW 5BRF
Mobile Converter

MORROW FTR
Mobile Receiver.

THE 5BRF SERIES CONVERTERS feature FULL DIAL (temperature compensated) band-spread on the 75, 40, 20, 15 and 10 meter bands, TEN HIGH-"Q" RF and MIXER COILS, FIVE adjustable OSC. COILS for precise tracking, TEN zero-temp CERAMIC TRIMMERS in the Mixer and Osc. circuits and RF ampl, Mixer and Osc. tuned by a 3 GANG CONDENSER. Added features include: IF AMP. with 4 tuned circuits, a 1525 Kc REJECTION TRAP to eliminate bdcst interference, ANTENNA TRIMMER, SINGLE SIDEBAND STABILITY and a built-in NOISE LIMITER. (Noise Limiter: model 5BR-1)

THE FTR fixed tuned receiver features: NARROW BAND-PASS 200 Kc IF Amp. (3.5 Kc at 6 Db down), SSB STABILITY with a Xtal controlled local Osc. and a series tuned BFO, NOISE BALANCED VARIABLE SQUELCH, hermetically sealed "S" METER, built-in FIELD STRENGTH METER and a receiver QUIETING (when transmitting) RELAY. All controls and "S" meter are located on front panel for maximum operating ease.

WHEN THESE TWO UNITS ARE COMBINED they become a beautifully matched pair . . . The first revolutionary mobile receiver with "big set" performance.

5BRF designed specifically for the new FTR $67.95
5BRLN to be used with broadcast receiver $69.95
5BR-1 same as LN with Noise Limiter $74.95

FTR RECEIVER and power supply (incl. Fed. Excise Tax) $128.40
All prices are Amateur Net

Available in either 6 or 12 V. models.

ENGINEERED FOR SUPERIOR RECEPTION

SEE YOUR DEALER FOR A DEMONSTRATION.

MORROW MOBILE ACCESSORIES

MORROW TOP HAT

High quality capacity hat for greater antenna efficiency. Tempered aluminum, buffed satin finish. Light weight and offers little wind resistance.

Amateur Net $2.50

MORROW SH SPEAKER

Heavy duty 5" PM dynamic housed in cast aluminum case. Universal easy mounting bracket. Designed to compliment your 5 BRF-FTR installation.

Amateur Net $7.50

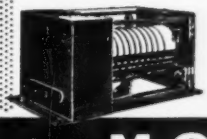
MORROW GC-10 OR GC-20 GENERATOR NOISE FILTERS

Tuned RF "hash" filter for 10 or 20 meter bands. Easy to install . simple to adjust.

Complete with instructions:

Amateur Net $3.75

MORROW MLV-50



Motor driven variable inductor for tuning mobile whip antenna to operating frequency by remote control from the driver's seat. Normally installed at whip base. For 75, 40, 20, 15 and 10 meter bands. Supplied with coax fitting, mounting, remote control switch and cable.

Amateur Net $24.95

BE MORE THAN SURE . . . BUY A MORROW!

MORROW
RADIO MANUFACTURING CO.

Sun.; GMN, 3860 kc. Mon. through Fri. 1200–1300; VTP, 3520 kc. Mon. through Fri. 1900. VTN went on winter sked Mon. Sept. 20th with JLZ, IT, VZE, TAN, and VTP as NCS. SIO has been appointed SEC. Those interested in becoming AREC members, please contact either your local EC or SIO. Th. Vermont C.D. Net is using alternate 'phone and c.w. at 1000 hours Sun. on 3993 and 3501.5 kc. Hurricane Carol had very little effect in our State, but our 'phone, c.w., and c.d. nets were operating and assisting those in the disaster areas. Carol had at least one good effect — it caused the boys to get their emergency equipment in readiness for Edna. C.d. members who have not received their tactical calls should contact their Radio Officer. Traffic: W1AVP 151, OAK 106, RNA 69, VVP 36, KJG 17, UGW 10.

NORTHWESTERN DIVISION

ALASKA — SCM, Dave A. Fulton, KL7AGU — The 1954 All-Alaska Hamfest was a huge success, with about one hundred attending. AYZ, from Nunivak Island, won the prize for the ham traveling the farthest distance with TI, of Juneau, running him a close second. ABT and PJ tied for first prize in the mobile judging. Because of the lack of accommodations at the various lodges it was decided to have future hamfests in the cities, with the 1955 hamfest to be held in the Anchorage Area. CP and AGU have installed base-loaded all-band coils on the mobile rigs, just to add more to the old argument about base-load versus center-load. AN and ZR are taking a well-earned vacation in W7-Land. AN and ZR are the only residents of Katalla, which makes it a one hundred per cent amateur town. AN claims he is the mayor, but if he is we'll bet ZR is the city manager. How about more AREC members?

IDAHO — SCM, Alan K. Ross, W7IWU — Only two appointees reported, and two others wrote in. WN7VWS, of Gifford, probably is W7VWS by now. However, he is moving to Oakesdale, Wash. Kellogg: RQG checks into the Montana 'Phone Net, FARM Net, and GEM Net. Post Falls: A first report was received from VLY. He has a 160- through 20-meter rig and wants to join the ARRL. Boise: NNX, from Casper, Wyo., dropped into the W.U. office for a visit with me. Always glad to see the fellows, so drop in anytime you're in Boise. TCI has his kw. off the air because of moving (building a new house) in town. Another single sidebander heard recently was BAR, of Idaho Falls. The Boise Hamfest was a great success with fun for all. It's amazing who'll buy what at the auction. Traffic: W7TCI 169, RQG 28, VLY 7, WN7VWS 5.

MONTANA — SCM, Leslie E. Crouter, W7CT — Congratulation to the Laurel gang on reporting the most activity this month. SMY is now modulating an 813 on 40 meters only. RDM is running 75 watts on mobile with a separate 12-volt generator. LBK built a negative peak overmodulation test instrument and reports it was worth while. Earl is running 190 watts to a pair of 813s while he is rewinding his plate transformer. The Laurel gang conducted a successful simulated emergency test with portable and mobile rigs running only three-quarters watt over a 10-mile radius. JRG reports nothing has been heard from various mountain top expeditions. KGJ is busy erecting and dismantling TV towers along with his TV service work. MVN has given up single blessedness and has an XYL. TKB is rebuilding for more stability. Recent appointments: FTO as OPS and OBS, MM as PAM, OPM as EC, and JRG as OES. The International Peace Park Hamfest held at Watertown in Alberta was very successful with Great Falls having the largest attendance. The next International Peace Park Hamfest will be held July 15, 16, and 17, 1955, in Glacier Park.

OREGON — SCM, John M. Carroll, W7BUS — Plans for the '55 convention are already under way in Portland. The OARS has appointed MSS as manager to assist. YG is resuming activity as an OBS both on A3 and A1 on 3675 and 3900 kc. TH needs members for OSN. VJT signed up for AREC. UMZ is active in c.d. at Myrtle Point. SCY's mobile got the highest field strength reading for close range at the convention. Milton Freewater has a local net on 29.6 Mc. OAP is interested in a club in East Portland. SO reports three mobiles helped the Lebanon Auto-Crats on the Reliability Run. With all the activity ESJ has as Asst. SCM, SEC, and Oregon representative for MARS, Connie still has time to act as OO and send in reports. PRA's operating time is shortened because of other activities. CZ has a new multiphase exciter for s.s.b. The Hermiston Club inspected McNary Dam at its last meeting. WN7VGD now has General Class ticket. TVW and RLG signed up for MARS. LY has been transferred to New York. KR went fishing in Canada. AZP has his Collins mounted in the house trailer and is using the free trailer park at BUS's ranch. LY, mobile, worked PZM from East Yellowstone using about 10 watts. Some traffic reports are not getting to the SCM in time to get in the news. The Oregon Slow Net had 21 sessions with a total attendance of 105. Traffic: W7QEI 219, AJN 78, PRA 75, LZG 30, HDN 23, OMO 17, EDU 7, KTL 6, PHJ 5.

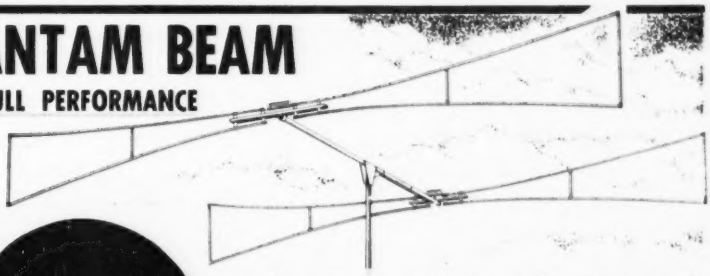
WASHINGTON — SCM, Victor S. Gish, W7FIX — The West Seattle Amateur Radio Club, Inc., meets the 2nd and 4th Wed. at 8 P.M. at 30th S.W. & West Graham Streets.

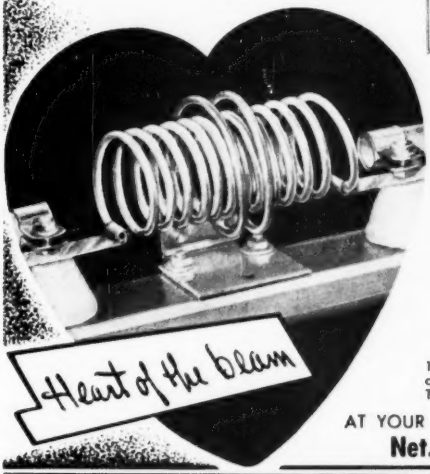
(Continued on page 110)

NEW GONSET PRODUCTS

GONSET BANTAM BEAM

THE HALF-SIZE, FULL PERFORMANCE 20 METER ARRAY





The superiority of the Gonset "Bantam 20" daily becomes more obvious as hundreds of users add new countries to their DX totals. There are excellent reasons for this outstanding Bantam Beam performance—Bow-tie element structure for broad banding . . . for added end capacity to ensure least possible number of coil turns and . . . . "The heart of the beam," ample size, very high Q copper tubing coils —silver plated, self-supporting (Air wound). Steatite element and coil end supports.

These and other significant Gonset design features greatly minimize losses, ensure . . . . . .

PERFORMANCE IN ALL KINDS OF WEATHER

approaching that of a full-length 20 meter array.

16½' tip-to-tip . . . very low SWR . . . symmetrical pattern with 52 ohm coax . . . good F-B ratio . . . rotated readily by any good TV rotator.

AT YOUR DISTRIBUTOR
Net...59.50

GONSET CO.
801 South Main Street Burbank, Calif.

SSB — 480-500W (Inst's Peak)

AM — 90-100W

CW — 220-240W

MODEL 500W GONSET MULTI-PURPOSE R.F. POWER AMPLIFIER

(LINEAR, CLASS AB$_2$ OPERATION)

Pi network output—one knob bandswitching (including grid circuits) covering 10-11-15-20-40-80 meters with provisions for 160.

Pi network matches 50 to 300 ohm loads.

Self-contained heavy duty power supply (4-866JR's in bridge) 80 mfd output filter for excellent dynamic regulation.

Economical, low-replacement-cost tubes.(4-807's)

Excitation control . . . greatly facilitates linear amp-adjustments.

Complete metering . . . individual 807 cathodes . . . grid current. Relative RF output.

Excellent linearity on SSB or AM.

Completely free from parasitics.. or self-oscillation.

Extremely low harmonic output.

You place your station in the "Big Signal" class the minute you connect the 500W to the output of your present small exciter or low powered Transmitter. 500W is a sure investment in improved, high power performance

Though your interests may vary from time-to-time, from CW to AM phone . . . SSB today or in the future . . . 500W retains full value with its ability to comply fully with changing modes . . . or moods.

At Your Distributor

GONSET CO.
801 South Main Street Burbank, Calif.

Officers are PN, pres.; AQA, vice-pres.; LCS, secy.-treas.; UJT, sgt. at arms, and publicity; ERS, steward. Directors are CWN, GNY, LWX, AUK, and GRM. Amateur license examining board: SOV, LHL, and PN. BA still is cutting down on traffic — only 2012 this month — and put up a new five-element 20-meter beam on his 90-ft. tower. SFN makes BPL for his first full month of traffic-handling. USO promises club news from the Vancouver Area. ZU had trouble with "Tur-Key" and had to go back to the hand key for a while. APS and PGY painted their houses this summer. FWD advises code transmissions will be resumed Sept. 7th and run through the winter unless his hat gives out. EHH reports a quiet month, but expects traffic to pick up on resumption of regular sessions. PKJ is on WARTS regularly. AIB, not looking for DX, hooked VP8AA in Antarctic on 7085 kc. URZ reports from Spokane: WIL is on 10 meters; USL has a new mobile; new WN calls are VRA, VWR, WDI, WDL, WJJ, WJK, WJM, WJO, WNE, and VXA; WN7VXS is moving to Olympia; NA is on 40-meter c.w.; NXN is Radio Officer for Spokane; URZ, USL, ULL, MNK, NVB, and WN7VRA have new Elmac Transceiters; JIF and OOF have new verticals; the Spokane Club held a picnic Aug. 29th — PXA won the c.w. contest. OEB is putting up the new two-element beam from May '54 *QST* and reports: VLC dropped the "N"; SWA/7, at new QTH. QNIs WARTS and WSN; LEC has p.p. 811 final; ATW is on 40-meter c.w. with 700 watts; MTX and UZE have new Rangers. JHX and TMU sent in OES reports. The 2-meter net meets on 145.8 Mc. at 8 P.M. Mon. UJA is building an 180-watter. HDT is on low power while the big rig is down for repairs. BG is getting squared away for the coming traffic season. The North Seattle and Bremerton Clubs are going for call letter car license plates this coming legislature. Traffic: (Aug.) W7BA 2012, PGY 1193, FRU 1036, SFN 875, HKA 266, USO 134, SOI 122, ZU 65, FIX 59, RXH 55, APS 52, TGO 46, LQ 41, FWD 28, GAT 24, JPH 24, SJL 22, EHH 20, AIB 15, AMC 13, NWP 8, KT 6, DDY 3. (July) W7SFN 168, KT 150.

PACIFIC DIVISION

HAWAII — SCM, James E. Keefer, KH6KS — C.d. and RACES operations in Hawaii are beginning to take shape under the guidance of AED and ABI. Sam and Leon have been visiting the various Hawaiian amateur groups and explaining the part they may take in furthering the functions of RACES and c.d. With the advent of this operation, 2-meter activity has taken a marked upward swing with a very efficient network being formed throughout the Territory. Those making BPL for August are KH6AJF, KA2GE, KA2FC, KA2NY, KA7RC, KA2MC, KA2HQ, KA2AK, and KA8AB. Traffic: (Aug.) KA2FC 2520, KH6AJF 1190, KA2AK 942, KA7RC 673, KA2GE 586, KA2HQ 452, KA2MC 348, KA8AB 252, KA2NY 227. (July) KA2FEC 4853, KA2FC 4850, KA2YA 3194, KA4DR 1424, KA2SL 1196, KA9MF 913, KA7RC 743, KA2AK 719, KA2GE 451, KA2NY 349, KA2MB 48. (June) KA2ZZ 1355, KA2NY 184. (May) KA2NY 180.

NEVADA — SCM, Ray T. Warner, W7JU — Well, fellows, there being no opposition you will have to put up with me as SCM for another two years. I wish to thank those who in the past have sent me monthly activity reports so that this column can be written. The following new appointments have been made: UPS, of Elko, as OPS; PEW, of Elko, as ORS; and BVZ, of Boulder City as OBS, who will transmit Official Bulletins on 7163 kc. at 11 A.M. PST, Mon., Tue., and Wed. OXX again has settled in Las Vegas after three months of mobile trailering. LGS is moving to Reno and has resigned as EC of Boulder City. K7FDB, Stead AFB, continues its outstanding traffic record with 2002 messages handled this month. 2-meter sked continues to keep JU QRL. Any Nevada station wishing to become popular need only get on 6 meters. VZS is a new station in Las Vegas. Traffic: K7FDB 2002, W7JU 11.

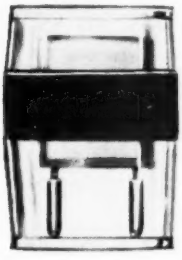
SANTA CLARA VALLEY — SCM, Roy I. Couzin, W6LZL — Preparations are under way for another fair exhibit by the SCCARA. LZL was chosen fair chairman for the fifth year. Fair traffic is a sore subject for most traffic men so SCCARA has cut the traffic to Armed Forces personnel overseas and at home. Up San Mateo way the club decided on a revision of the name so after a vote the decision was San Mateo Radio Club. NTQ had to drop OBS appointment because of business but has been appointed OO to keep in c.d. activities. EXX is the new representative of PAARA to CCRC. OPL is keeping busy on the nets and is planning to move soon. AIT finally got the VFO operating. HC still is keeping busy on the nets plus his teaching effort and now is Assistant Director. K6BAM sends in his first activity report as a new OO. K6BBD is vacationing in Santa Cruz and visiting ex-San Jose RTE. His Model A is awaiting call letter plates. UTV keeps busy on PAN and always sends good traffic reports. 4YIP just moved into the section and I want to welcome him to the area. George is living in Sunnyvale at 293 Taylor St. and is waiting for his sixth area call. MMG hopes to have his 522 fired up on 144 Mc. soon. He also reports that the Bay Area Net (BAN) has been changed to Northern California Net (NCN), and now includes all of California north of Tehachapi. WLI reports slow traffic this month. He would like to join a DX

(*Continued on page 112*)

For the accuracy and stability needed by

SINGLE SIDEBAND

. . . Pan-El Plated Crystals



Crystals for sideband operation must be ultra stable.

The new plated crystals pioneered by Pan-El for amateur use supply this quality.

Because:

—the electrodes are bonded to the quartz, and cannot shift.

—being of precious metals, surrounded by nitrogen gas, they cannot corrode.

—each crystal is selected by X-ray measurement to assure excellent temperature coefficient—which means good stability.

—each crystal is precision mounted; triple-flushed with dry nitrogen; hermetically sealed in a nitrogen atmosphere; and guarded from our plant to you in a sealed plastic case, as shown here.

Hence they retain their accuracy and activity indefinitely.

Yet Pan-El crystals for amateur use are sold at prices competitive with the old style crystals, as follows:

PRICES

P-18A 3500 to 4000; 5001 to 5006; 5292 to 5298; 7000 to 7400; 8000 to 8400 to the nearest integral KC.....$2.75 each

P-23A 14000 to 14350; 28000 to 29700 to the nearest 10KC..... 3.75 each

P-23 27255 (.05" pins) Citizen Band..... 3.95 each

All with .09" pins spaced .486" to fit FT243 sockets, except as noted

Since 1942, Crystals for mobile . . . ship to shore . . . aircraft

PAN-ELECTRONICS CORPORATION

901 WEST PEACHTREE STREET, N.E., ATLANTA, GEORGIA

QUANTITY PRODUCERS OF STANDARD AND SPECIAL

Control Crystals

Pan-El

club but hasn't 100 countries yet. Does this bar him? I'd like to know also. He would appreciate any information forthcoming. Traffic: W6UTV 258, HC 129, K6BAM 34, W6OPL 19, WLI 12, K6BBD 10, W6AIT 8, MMG 5.

EAST BAY — SCM, Guy Black, W6RLB — Asst. SCMs: Oliver Nelson, 6MXQ; Harry Cameron, 6RVC. SEC: WGM. RMs: IPW, JOH. PAM: LL. ECs: CAN, CX, FLT, QDE, TCU, ZZF. The Central California Radio Council met at LGW's new QTH in Alamo on Sept. 1st, at which time the Council's Field Day Award was presented to the Santa Clara County Amateur Radio Assn. for the second consecutive time. AKB and WSH are the Mission Trail Net's new representatives to the Council. The Richmond Radio Club is running a "worked all states" contest among its members, with separate awards for 'phone, c.w., and Novice. EFD is manager of the new Northern California Net, which replaces the Bay Area Net. The Richmond gang had a picnic in Pinole. KN6EDN is working hard on the code. NBS is rebuilding. QPY has decided to stick to c.w. HBF has SAD for a teacher at school. ERR, CDT, and TYP had a fine 2-meter field trip on the last week end in August and worked plenty of stations in both Los Angeles and the Bay Area. They caused a sensation in the southland by rebroadcasting repeater station K6GWE to the Los Angeles gang. ERC is a new ham in Oakland who is interested in traffic. NJX wants to swap gear. The East Bay Radio Club has a special teen-age group meeting on the 4th Tue. of each month in the Albany City Hall. The Oakland Radio Club featured a social night at its September meeting. Two new SWL members are Herman Karre and Wm. Logsdon. Get your tickets, fellows. BBU has been operating on 2 meters from the hospital at Ft. Miles. CAN's rig has been blowing filter condensers. The Napa Club has been handicapped by vacancies among its officers. The Hayward Radio Club meets the 2nd and 4th Fri. at the airport. It is best to call up Ron White, IMC, 403 Alden Road, Hayward, for instructions on how to find the right building. The North Bay Amateur Radio Assn. meets the 1st Fri. only in the Vallejo Red Cross. The Mt. Diablo Radio Club meets the 3rd Fri. in the Coast Counties Gas Co. Bldg., Walnut Creek. The teletype gang is meeting the 3rd Thurs. in the Oakland Red Cross, 906 Fallon Street. Traffic: K6FDG 1193, W6QPY 232, AKB 110, HBF 11, EJA 7.

SAN FRANCISCO — SCM, Walter A. Buckley, W6GGC — IOT, field engineer for Western Electric Co., spoke on "Airborne Radar in Heavy Bombers" and James Maloney told of new insurance covering amateur equipment at the San Francisco Radio Club meeting. URA is new president and UOQ newly-elected secretary of HAMS. The S.F. Naval Shipyard Club and HAMS are having their annual picnic together this year. Attended the August meeting of the Humboldt Radio Club and was pleasantly surprised to see such a large group during the vacation season. The radio station manager spoke on "Conelrad." BME, a professor at Humboldt State, has returned to Arcata from Oregon. IRJ visited the Club. K6DVV dropped the "N" from his call. ZZC, from Wasco, attended the last club meeting of the Tamalpais Radio Club and won a prize. TVI problems were discussed. Club member RHD is putting out a nice paper on club news. It is reported the boys enjoy net control on c.d. being passed around. ZUB has had the emergency rig on the air with good results. END has been heard on 160 meters. KZF is his usual cheerful self after his recent accident. RZS is on the air with suppresser modulation. The 29ers had a very successful 10-meter transmitter hunt last week with a big turnout. The local civil defense participated in the San Francisco Airport Festivities Aug. 26-27-28 at the opening of the 15-million-dollar airport. Bergermister Brewery lent the boys their demonstration truck and the amateurs took their place of honor next to the Irwin Blood Bank and First Aid demonstrations. NL handled 2 meters. GGC brought down a 32V-2 and a 75A-3 and many of the boys showed up to help out the cause. ZYI is home from the hospital. ERS handled 24 messages while in Washington and Oregon and used BIP as a relay station. KN6GXQ is the newest candidate for the title of "youngest ham." She is the daughter of NAK and is 10 years old. KN6GWS is a local 14-year-old Novice and joined the San Francisco Radio Club. RHD reports prospects for 10- and 15-meter operation are picking up and that fair DX has been heard on both bands. GHI now is mobile on 75 meters as HRW. BMY has gone 300-watt s.s.b. MXJ also joined the s.s.b. ranks. ATO is busily working on a new beam. GCV has an order in for a new SX-88. K6CQE sports a new Viking II. QMO reports fine results with her code classes. About seven ladies are ready for the General Class exam. Looks as though the Ladies Club is showing the men that XYLs do enjoy the hobby of ham radio. AHH has been appointed "historian" of the San Francisco Radio Club. UEV is busy with installation of gear at new QTH. Congratulations to PHT, QMO, and SWP on making BPL and winning the first medallions in this section. GQA's OO report shows just one WN call, all the rest are General Class calls. The trophy for high Field Day score awarded by the Central California Radio Clubs was won by UW, the Santa Clara Amateurs. Traffic: W6PHT 939, QMO 723, SWP 543, FVK 142, BIP 48, ERS 48, GGC 38, ATO 5.

(*Continued on page 114*)

SACRAMENTO VALLEY — SCM, Harold L. Lucero, W6JDN — Orchids to the Shasta County Amateur Radio Club members, who are building a ham rig for a chap who is inflicted with polio. From the SEC we learn that in Sacramento we have acquired three Collins 32RA transmitters to be used on c.d. and any emergency that might arise. A demonstration for the director and his assistant of the Sacramento Operational Area was held at the club house to show them the difference between a pipe line on 2 meters and the fight of QRM on 75. Thirty amateurs attended the Golden Empire Club picnic held Aug. 15th. KYO and RXX have new B&W 5100 transmitters. GEO is on 75 meters with a new Viking. MLU is working 75 meters. IU is back on after a long layoff. The Yuba-Sutter Radio Club has a lending library which should help new hams. FXJ installed a new Elmac mobile complete. HBM, a v.h.f. man, now is on the low frequencies. K6BIQ also has a new rig on the low frequencies. K6CFZ reports activities slow around Colusa. K6EDI graduated from the Novice ranks. FXJ is back on the air with an Elmac and is on 144 Mc. KUI installed 75-meter rig in his pickup. He also is active on 144 Mc. GVA is gathering material for a new beam when 10 meters opens. SBH is one of the top Official Bulletin Stations. LLR is in charge of the code classes. GDO and his XYL, K6HHD, have a new harmonic. K6BJO and BSC are new hams in Dunsmuir. The Dunsmuir Club is going after a long layoff. ILY and DDC are on 40 meters. JDN has been trying the c.w. nets for a change. The Sacramento Valley section held a meeting in Chico Sept. 25th. Traffic: W6REF 404, MWR 28, JDN 12, SUP 1.

SAN JOAQUIN VALLEY — SCM, Edward L. Bewley, W6GIW — SEC: EBL. RM: K6BGM. PAMs: ZRJ, WJF. K6BGM announces the abolishment of the SJVN, but the section is taking part in the Northern California Net (NCN), recently formed on 3635 kc. at 1900. Communications for the Turlock and Merced parades were provided by local amateurs. Those helping in the Turlock parade were DGI, DEY, EKS, EQO, GIW, GYN, QER, SQR, and ZRJ. Those helping in the Merced parade were EKS, BMM, YWH, BUA, ZRJ, GGX, CPO, GIW, SQR, DUU, and BCY. K6BMM is building a 40-watt 807 mobile rig. WJF and FEA built several portable antennas, including a three-element 10-meter beam, for use while on vacation. GUU soon will have his Viking on the air from Jackson. DBH is conducting code classes. One of the students is 15 years old and blind. IER, LRS, CZO, OVR, and QNC provided communications for the annual Motorcycle Hoot Owl Run. BCY is organizing an AREC net on 3995 kc. for Merced County. GIW operated portable from Alpine County for two weeks and had lots of QSL cards along but only one requested for WACC, which was sent to ZKP. TTX, 16 years old, reports he received his MARS call recently. On Aug. 28th the Fresno Amateur Radio Club participated in a half-hour television show devoted to ham radio. Home-built equipment was shown, DX cards were exhibited, etc. Hams participating were JXY, Club president; MGN and FKL, members of the Board of Directors; and PCS, Fresno's foremost DX man. Of the KMJ-TV engineers on duty in the studio at the time two were hams, DBU and VKS. You must send us the news, gang, before we can report it. Traffic: W6ZRJ 128, TTX 126, K6BGM 60, W6EBL 19, WJF 16, FEA 14, K6BMM 2.

ROANOKE DIVISION

NORTH CAROLINA — SCM, J. C. Geaslen, W4DLX — The following report was submitted by SOD: GIJ is off to college. WN4GHR is working DX at last. NUN is back in his home town after several years. New jr. operators arrived for BTP/SOD (a girl) and TMY (a boy). With sorrow ZQZ is added to Silent Keys. Howard died as the result of a glider crash at the local airport. VOX is back after spending the summer at Cullowhee. Traffic: (Aug.) W4WXZ 514. (July) W4VHH 45.

SOUTH CAROLINA — SCM, T. Hunter Wood, W4ANK — GQE is stationed in Charleston and is setting up his 500-watter on the Isle of Palms. 8STV is stationed at the Minecraft Base in Charleston; he is interested in operating the club station and experiments with vertical antennas. FM has a new 75-meter doublet fed with a 304TL transmitter that is giving him better reports. ZIZ works both c.w. and 'phone nets and is looking for traffic. GQV is newly on the air from Rock Hill and works both c.w. and 75-meter 'phone. WN4HGW is looking for contacts on 3735 kc. with a new NC-88 and a Gross CW-25 transmitter. New officers of the Aiken Club are KYN, pres.; ESD, secy.-treas. ZQS, act. dir.; and 8TH, publicity dir. At the September meeting the Aiken Club had 4 new members; 19 regular members were present with KYN speaking on the subject of matching antennas to feed lines. TTG has constructed a grid dipper. Thanks to TTG and 8TH for FB reports from activities in Aiken. FFH was appointed the MARS station of the month. FLG is back on 40-meter c.w. from Charleston. The mobile roundup meets on 3930 kc. at 2 P.M. Sun. and all stations are requested to assist in keeping the frequency clear for the mobiles during this time. Fixed stations to assist the mobiles especially are desired. Traffic: W4FFH 111, ZIZ 78, FM 7, ANK 4.

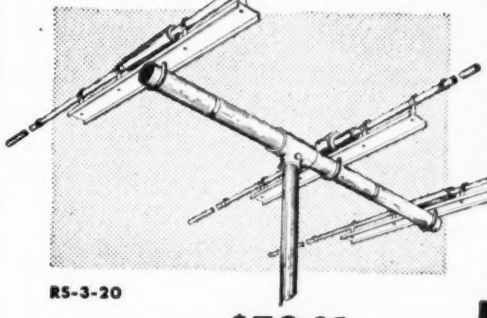
(Continued on page 116)

NOW... First Complete Line Of Shortened Antennas

R-S PRODUCTS

NOW FOR THE FIRST TIME the amateur can select from a full line of professionally engineered short antennas. You can pick a 3 element or 2 element rotary beam, or short dublet to fit your most EXACTING requirements. All PRE-TUNED and PRE-ASSEMBLED at the factory.

The New--20 METER SHORTBEAM PRE-TUNED!



RS-3-20

Amateur Net $59.95

...3 ELEMENT ROTARY BEAM

RS—2-15
New 15 Meter 2 ELEMENT SHORTBEAM
Amateur Net **$44.95**

RS—2-20
New 20 Meter 2 ELEMENT SHORTBEAM
Amateur Net **$49.95**

RS—2-40
New 40 meter 2 ELEMENT SHORTBEAM.
Amateur net **$74.95**

RS—3-15
New 15 meter 3 ELEMENT SHORTBEAM.
Amateur net **$54.95**

RSD—80
New 80 meter SHORT DUBLET.
Amateur net **$14.95**

RSD—40
New 40 meter SHORT DUBLET.
Amateur net **$14.95**

Complete—Pre-Assembled!

Pre-assembled at the factory. All complete—Coils, elements, cross arm, stand-offs and "U" bolts are assembled as one unit. Attach the three elements to boom and you are ready! You get "top-man-on-the-frequency" results even in a limited area installation.

Forward Gain 4.8 DB over full size Dipole

- Element lengths, 16 feet (approximate).
- Boom—16 feet.
- Approx. weight 20 lbs.
- Turns with a T.V. Rotator.
- Front to back ratio better than 20 DB.
- Designed for 52 ohm coax.
- Director spacing .1 wave-length.
- Reflector spacing .15 wave-length.
- Pretuned for 20 meter phone band.
- 61 ST aluminum used for elements, boom, cross arms and mast.
- One-man installation.

AVAILABLE AT YOUR DISTRIBUTOR

TERRITORIES OPEN

RADIO SPECIALTIES INC.
354 SEVENTH AVENUE, BROOKLYN 15, N. Y.

VIRGINIA — SCM, John Carl Morgan, W4KX — By the time this appears, VN and VSN should be back in the regular groove. All Virginians are urged to report, whether they fancy themselves "hot" traffic operators or not. VFN continues to prosper under the able managership of TVO. Liaison stations are needed between c.w. and 'phone nets. Interested? Contact TVO. WBC reports an active MARS Headquarters Net in the area around D. C., plus a MARS Novice C.W. Net. ODN could use more participants, says OWV. Four new WNs in the Winchester Area as a result of ATQ's SVARC classes are HXB, HXH, HXJ, and HXN. KN4ACI is a new Novice in Harrisonburg. Welcome to YIA back at Yorktown. Sorry to lose KSD, who has moved to Texas, and 3STU/4, who is leaving for Japan. PCC, the Roanoke Club station, is being kept hot. YVG acted as official starter for the Old Dominion Motorcycle Road Run, with various hams acting as check points along the 500-mile course. Assisting were TFZ, UUJ, ZVQ, JAU, RLA, ODA, FV, DYV, CXQ, ULL/M, and RGZ/M. The mobiles have been kept busy during the summer. Several can be heard in VFN regularly. ZFV says he'll have portable gear for use between studies. IF is readying the QRO rig and restringing antennas. YZC is back in Falls Church after spending the summer in North Carolina. For the benefit of those who might be interested in AREC, drop a line to NAD, the SEC. Especially needed are volunteers for EC in the less thickly settled counties. May I again urge all Virginia amateurs to send in reports of traffic and/or other activity each month, whether you hold appointments or not. Please mail them so as to reach me by the sixth of each month. A number of appointees who have failed to report or give other evidence of activity are being cancelled. We hate to do this, fellows, but the deadwood can't accumulate indefinitely. Traffic: W4TYC 46, PCC 42, YVG 33, BLR 32, OWV 25, TVO 22, ZFV 18, RJW 10, IF 8, WBC 3, YZC 3, WN4CHK 3.

WEST VIRGINIA — SCM, Albert H. Hix, W8PQQ — ORC has clampertube modulated rig on 7 Mc. which sounds very good. QHG is getting the DX bug and is modifying his 40-foot vertical for 20-meter operation. LS bought a mobile rig and will be on with it soon. Bob is installing the rig he won at the Princeton ham picnic. The Stonewall Jackson Club staged a very nice ham picnic at Jackson's Mills and had a good turnout. NCS has been nominated for the G.E. Edison Radio Amateur Award. Let's all hope he makes it. He did a splendid job during the recent Richwood flood. OIC now is an Air Force MARS member as AF8OIC. BKI schedules 4PCT, 8LPD, JWV, and BFQ on 144 Mc. HI is going mobile. EOJ is building a new kw. s.s.b. rig. LGB has an s.s.b. rig. It would be appreciated if the participants in both the 'phone and c.w. nets would send in reports of their activities monthly. Report cards will be furnished to all who desire them. HZA has a 10-meter ground-plane antenna perking. Traffic: W8AUJ 96, MBA 61, HZA 56, GEP 41, NYH 31, DFC 16, PQQ 11, RRD 5, KQD 2, WN8QWU 2.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Karl Brueggeman, WØCDX — SEC: MMT. We now have 23 ECs in Colorado and we wish to welcome NIT, NUU, and DWE as ECs for Pueblo, Sterling, and Loveland, respectively. Send in all the news you can because we like to print it. KQD now has the home rig going and is putting out a very fine signal. The rig is a new B&W 5100. RTA missed BPL for the first time since the club station was set up because of transmitter trouble. IC now is single sideband with a new 10A. IUF has put up a new folded dipole on 75 meters and pulled his signal out of the mud. BON has his antenna farm almost finished now with separate antennas for all bands. Swede says that the 160 wire will have to wait until the neighbors in the next block will let him hook onto their tree. The CEFN is holding an on-the-air EC meeting on the last Sun. of the month. This comes during the regular net meeting at 0830 and will consist of an EC roll call, reports, and any activities in the area. Please attend if you can and we'll get our EC reports 100 per cent. Remember, the last Sun. of the month at 0830 on 3890 kc. Traffic: KØFAU 1643, WBN 1362, WØRTA 464, ENA 167, BON 54, KØWBB 50.

UTAH — SCM, Floyd L. Hinshaw, W7UTM — BSE has been very QRL with vacation relief at KOAL, but found time to work his first 'phone contacts during August. CCC has moved to Los Angeles. We lose a good president of the UARC in Salt Lake City and Utah loses a dyed-in-the-wool contest man! QNF returned from the Air Force this month. SL still is too busy at work to find ham time, but has hopes. The UARC held its annual hamfest at Lagoon Resort this month instead of an August meeting. VSJ has graduated to General Class and is now heard on 75 meters. During August many Novices burned the midnight oil in preparation for the September date with the R. I. Traffic: W7UTM 7.

WYOMING — SCM, Wallace J. Ritter, W7PKX — The Wyoming hamfest was a big success with 80 amateurs attending and 20 mobile units present. The 10-meter transmitter hunt was won by ØGDZ, the 75-meter hunt by 7ILL, with the prize for the best mobile installation going to PSO. ØIC and 7PKX were tied in the c.w. speed contest.

(Continued on page 118)

SINGLE SIDEBAND

for the Radio Amateur

$1.50

U.S.A. Proper
$1.75 Elsewhere

A digest
of authoritative
articles on amateur
radio single sideband

Now Available

Copies of this brand-new ARRL publication, a digest of the best SSB articles that have appeared in QST, now are available from your dealer or direct from ARRL.

The amateur planning to break into Single Sideband operation, as well as the amateur already using SSB, will find this publication indispensable. Starting with an introduction to Single Sideband, the text is carefully organized to cover such subjects as Modulators, Phasing, Linear Amplifiers, VFO's, Voice Control Break-In, and includes not only discussions of theory, but plenty of practical how-to-build-it descriptions of equipment. The entire area of Single Sideband is covered, reception as well as transmission. Order your copy now.

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

QPP has been appointed Assistant Director. HYW passed the century mark with FA8RJ. NVX is QNS rebuilding mobiles for all-band operation. BXS is using a new Viking II with VFO. The Casper Club reports the new club house almost completed. Mobiles NVX, PSO, and AMU assisted in the timing of the Boy Scout canoe races on N. Platte River. PJS operated portable at the County Fair, putting out a nice signal on 75 meters. KFV is deserting s.s.b. with a Viking Ranger. PKX is working VKs and ZLs on 80-meter c.w. during long-skip conditions. TGZ and PKX maintained the only communication for the Forest Department during the Big Horn forest fire, with LLP at the fire location. The Pony Express Net on 3920 kc. now is operating at 0700 MST seven days a week, thanks to the assistance of PAV and AXG. UZR is on a tour of duty with CAP. Traffic: W7PKX 195.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Joe A. Shannon, W4MI. The excellent hamfest in Decatur wound up the season. ZSQ walked away with the main prize, a complete mobile installation! YRO made BPL in August via the originated-delivered route. WOG reports that his class for Novices is bearing fruit. He has three awaiting licenses in Fayette. AENR still is going strong. EBD says 130 reported in during August. DXB is having fun with the new 5-watt 75-meter mobile rig. The Naval Reserve training cruise kept USM off the air most of the month and EJZ says that hot weather made him lazy. The Huntsville Club now has a committee on giving license exams to follow up the new code and theory class. The Tuscaloosa Club also has a code and theory class under way with BWJ and WYN handling the instruction. They hope to have several ready for exams very soon, and are making plans for new classes. BFM is holding classes for a group of YLs in Decatur but no progress report has been received to date! Traffic: W4IHK 163, YRO 148, WOG 140, KIX 86, TXO 34, EBD 23, PWS 20, TKL 15, DXB 8, VIY 7. (July) W5ONL 4 175, W4YRO 30, PWS 19, MKV 9.

EASTERN FLORIDA — SCM, John W. Hollister, jr., W4FWZ — Our SEC, IM, the County ECs, and our Net Control Stations are all doing a great job with the fine help of all participants. The big news in August was the extremely successful four-county (Palm Beach, Broward, Dade, and Monroe Counties) AREC hurricane warm-up test. Key stations were NVU, SJK, DRD, AT, IM, PPR, IYT, WS, ZIR, FDE, and LVV. The DEN and USCGA did great work. WYR and the mill speeded things for NVU. NHN, the Novice Hurricane Net, is one year old and growing! Interested? Contact YJE, SDR, BKC, and WN4EGB Sun. at 10:05 A.M. on either 7188 or 3725 kc. Try both, as conditions vary. The Palmetto Net (3675 kc.) has a new skipper, LAP. DVR really did a swell job while he was NCS for Palmetto and brought it out of the doldrums. Success to LAP and the gang. They handled 307 messages in August. Brooksville: WN4HSN is new with help from TWR. Daytona: AYD reports 6 hams at the Mary Karl School. Ft. Lauderdale: PM reports mobiles helped in the polio drive by calling to pick up donations. MVR and SDI tell me the last transmitter hunt by the Flamingo Net was so good that many of the gang were all around the boat on which the rig was hidden and didn't know it so NJM and RID, the hiders, got the prize! *Bird Sparks* tells about TOJ and the Grave Yard Net, a ghoulish thing for the sleepless. Gainesville: RVU is at the University. Jacksonville: VMF, with Ma Bell, moved from Alexandria and is using a Viking and HRO plus mobile with Elmacs. Lakeland: SVB and BJI have air-conditioned shacks. YKR uses a Viking. Miami: PBS says PAA supplies QSLs for the DEN and classy ones too. LFL (an OO) uses 75A-2, 5" Panadapter 32V-1. IEH demonstrated s.s.b. at the Club with Multiphase 10A. FP&L Co. donates QSLs for club members. St. Petersburg: We are glad to hear that EYI is improving from recent ticker trouble. Tampa: We are sorry to hear that DES lost his father. Tallahassee: WN4FJK is using a Walter Ashe rig. Traffic: (Aug.) W4DVR 227, DRD 57, LAP 125, WEO 115, PBS 46, IYT 30, WS 28, RWM 23, LFL 10, FWZ 9, AYD 7, SVB 7, FSS 6, DES 4, WEM 4, DRT 1. (July) W4SVB 6.

WESTERN FLORIDA — SCM, Edward J. Collins, W4MS/RE — SEC: PLE. ECs: HIZ, MFY, RIH. PLE is rapidly getting the emergency units into shape and all interested parties should contact him or the nearest EC. UUF is working up into Tennessee on 144 Mc. HJA and 9CPI 4 have B&W 5001 rigs going. WN4HJU and WN4HJW are on 40 meters. BGG is working all bands with a Viking Ranger. GMS also has a new Ranger. BBU has a nice layout. PTK constantly improves mobile. TTM keeps the home station perking. DAO, RZV, HIZ, FDL, PQW, and UUF meet on the 75-meter Pensacola Party Line each Sun. A.M. All of the gang are going great guns to make the Pensacola Amateur Radio Club station one of the best in the country. CCY is the big DX man of the area. UCY is watching 10 meters. QK is about ready for 75-meter 'phone. JV has changed QTH and promises rhombics. EQR is dusting off the 144-Mc. gear. UYS is hearing 144-Mc. DX and rebuilding the transmitter. MS hopes to be s.s.b. soon.

(Continued on page 120)

INDUSTRIAL RADIO
FIELD-FONE

THE SMALLER, LIGHTER 2-WAY PORTABLE RADIO FOR CD AND OTHER VITAL COMMUNICATION REQUIREMENTS

Unit consists of a crystal controlled FM transmitter, crystal controlled dual conversion superhet receiver, weather resistant push-to-talk handset and self contained batteries in a convenient and attractive carrying case. Simplicity of operations and exceedingly good operating range have won instant approval for all portable 2-way applications. FIELD-FONES carry F.C.C. and F.C.D.A. type designations.

INDUSTRIAL RADIO
PAK-FONE

2-WAY PORTABLE RADIO WITH 3-WAY POWER SUPPLY

The PAK-FONE is a complete portable communication center which may be operated on 115 V.A.C., from a 6 or 12 volt auto storage battery or from its self contained batteries. Dual conversion superhet receiver provides good loud speaker reception. Greatly increased battery life is achieved through use of a relay type squelch circuit which switches off audio filaments when no incoming signal is present. Crystal controlled FM transmitter operates with push-to-talk button on microphone. PAK-FONES carry both F.C.D.A. and F.C.C. license designations for operation in 40 MC and 150 MC bands.

FACTORY REBUILT AND GUARANTEED PACK-SETS

Similar to the PAK-FONE but designed for operation on self-contained batteries only, Industrial Radio PACK-SETS represent outstanding values in 2-way portable equipment.

MODEL 3035 . . . PRICE ONLY . . . **$225.00** F.O.B. Factory

SPECIFICATIONS OF PACK-SET MODEL 3035

TRANSMITTER
8 Tubes — Crystal Controlled
FM DEVIATION: ± 15 KC
SPURIOUS RADIATIONS — At least 40 db below carrier level.
TEMPERATURE RANGE — —30° C to 60° C
OUTPUT — 1 Watt

RECEIVER
15 Tube Dual Conversion Superheterodyne, CRYSTAL CONTROLLED.
SENSITIVITY — .5uv for 20 db quieting.
SELECTIVITY — 75 db. plus or minus 80 Kc.
OUTPUT — .2 Watt

STANDARD EQUIPMENT: Microphone and Antenna. Crystals extra.

OPTIONAL EQUIPMENT: Weather resistant canvas carrying case, car window or roof top antennas.

Write for literature and prices . . .

INDUSTRIAL RADIO CORP.
428 N. PARKSIDE AVE., CHICAGO 44, ILLINOIS

AXF and VR remain loyal to 7 Mc. YES has moved to Pensy from Alabama. YRF and BGG are working on the Pensacola High School station call. YFF, YFG, YFH, and CGX keep their combined station perking regularly. WN4HBK and IGF are welcome newcomers. PQW has a new QTH.

GEORGIA — SCM, George W. Parker, W4NS — SEC: OPE. PAM: LXE. RMs: MTS, OCG. Nets: Georgia Cracker Emergency Net meets on 3995 kc. at 0830 Sun., and 1900 Tue. and Thurs.; Georgia State Net (c.w.) on 3570 kc. at 1900 Mon., Wed., Fri. New appointments: LXE, EC for Fulton and DeKalb Counties. He also is RACES Officer for the Atlanta C.D. Area. HDC is moving to W6-Land to work with North American Aviation. UQI is moving to Texas. GMP now is active on 20 meters from YUIGM. New officers of the Athens Club are EEE, pres.; FGU, vice-pres.; PGZ, secy.-treas.; OTA, act. mgr.; and BGH, publicity chairman. The Club has a new club house and a rig on the air. The Atlanta Radio Club, the Kennehoochee Radio Club, and the Confederate Signal Corps combined forces to time the annual reliability run for the Atlanta Motorcycle Club. Mobile stations were spotted at check points along a route of over 150 miles to flash the timing of the various contestants to the Motorcycle Club House. The mobile truck unit of the Atlanta Club acted as home station, and fixed stations in Atlanta and Marietta relayed the information for the mobiles. RS is a new ham in Cedartown. RTY has moved back to Cornelia. GGZ is back on the air in Cornelia. IVH is active on 75-meter 'phone in Gainesville. KFL now is a married man. ZD was his best man. The Atlanta Club has started code and theory classes. Your SCM needs more reports and news. Traffic: K4WAR 1288, FCI 342, W4HMQ 74, OCG 58, MTS 30, NS 12, MA 10, ZD 8.

WEST INDIES — SCM, William Werner, KP4DJ — SEC: HZ. RK plans for mobile. RD is on 75 meters with BC-312 and BC-223 as emergency gear. MO is tuning new 20-meter beam. ZN has Tel-Rex 20-meter beam. WR has a new 15-meter beam. HG is back on 75 meters. DV is operating mobile with new Elmac transmitter and receiver. HZ is rebuilding mobile transmitter. WN has been operating portable KV4. KD received WAC 'phone and WANE certificates. VB, UK, YC, VO, WI, and PM have left KP4-Land. AZ is getting parts together for a lazy-kw. using a pair of 4-250As. JE continues working DX on 20-meter c.w. IY is realigning the Super Pro. WF is practicing code to get General Class ticket. W2CZU/KP4 is building a kw. Class B final. DJ de-TVIed the Signal Shifter on all bands. MARS Director ZY is active on 20-meter 'phone. The 3925-kc. AREC Net continued active during the summer. The Antilles Net, NCS KP4TO, provides weather reports twice daily from the islands between Puerto Rico and Trinidad. USWB requests that KP4s organize a weather-reporting net covering the four sides of Puerto Rico and especially the mountainous center portion. USWB will provide, install, and instruct those who volunteer. A minimum of one report seven days per week is required. A new KP4 at Ramey AFB is KP4ZW, ex-DL4TJ, W4LDM, W5FTH, and W6PWZ. ZW skeds DL4MW and W4FPC. Traffic: KP4ZW 655, DV 3.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Howard C. Bellman, W6YVJ — Congratulations to the W6LS boys from Lockheed for doing their bit up Mt. Whitney. Their report to me was signed by VYQ, vice-pres. of the Club, VIB, K6BKM, and Ben Ettelson. K2EJT, of La Crescenta, who is nearly blind, received a nice write-up in the local paper when some of the hams in the neighborhood fitted him out with ham equipment. In Bill's own words, "W6QJZ built up the power supply and brought it with the ARC-5, W6LHB brought the RME-69 and Faust Gonset sent up a Gonset Commander transmitter." Bill handled 109 pieces of traffic, and all with a tape recorder. K6FCZ and K6CST alternate weekly as NCS of MCAN-4. K6BEQ has nothing new but a YL. ORS runs 9 watts input on 223.02 Mc. nightly into a "J" antenna, out Alhambra way. TVI has slowed up HIF. CBO has been ill. EBK is enjoying s.s.b. on 75 meters. 2-meter activity observation by the old sage, BHG: Los Angeles Area — 100 per cent, San Diego Area — 75 per cent, San Francisco Area — 25 per cent. May our section take pride in the announcement by the State Office of Civil Defense that QJW has been appointed RACES Radio Coördinator of Region 9 (Los Angeles and Orange Counties). Included in the announcement is the appointment of LY as Commercial Radio Coördinator. QJW, our SEC, reports for the month of August — a total of 1235 AREC with about 400 mobile units. USY just can't wait to learn to type faster so he can take code faster. Les received from W7FIX, of *PAN News* fame, MTHC No. 40, and from an early Santa Claus, a new typewriter. Don't forget our c.w. net. LSN has changed its name to Southern California Net and operates the same frequency, 3600 kc., but at 7:30 and 10:30 P.M., local time, in order to work into the NTS. Jim, of K6FCZ, is getting out of the service soon and is going back to college. He says that after a year and a half the gang finally got a 20-meter beam up and anchored properly against the nasty blows they have at the Air Base. Traffic: K6FCZ 823, FCY

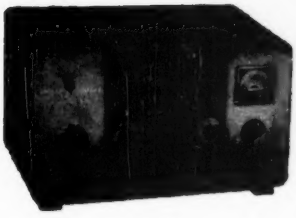
(Continued on page 122)

NOW HENRY DARES TO GIVE YOU THIS GUARANTEE

100% SATISFACTION
or Your Money Back at end of 10 day Trial

Bob Henry, WØARA Butler, Mo.

Ted Henry, W6UOU Los Angeles



NEW VIKING "RANGER"

Transmitter Exciter Kit

Kit, less Tubes **$179.50** Factory. Wired, less Tubes **$258.00**

Built-in VFO—TVI Suppressed—Band-switching—seven bands—75 Watts CW Input — 65 Watts phone input. Offers more features than any Transmitter/Exciter ever built for amateurs!

ONLY HENRY GIVES YOU

- Top Trades
- Only 10% Down
- Easy Terms
- Fast Delivery
- Personal Service
- Low Prices
- Complete Stocks
- We want you to be satisfied. Ask any Ham about Henry. And Henry has the new equipment first.

New NC98 ONLY

Now for the first time, your choice of electrical bandspread calibrated for either amateur or SWL bands. A crystal filter, an S-Meter, an RF stage and 2 IF stages.

15.00 Down

18 monthly payments of **$8.00**

Cash price **$149.50**

Some of the many items in stock are:

Collins 75A3 and speaker	$550.00	Viking 11-CD factory wired	398.00	Hallicrafter SX88	595.00
Collins 32V3	775.00	Elmac PMR6A or PMR12A	134.50	Gonset Super-6	52.50
Hammarlund HQ140X	264.50	Elmac AF-67	177.00	Gonset Super-Ceiver	119.50
Hammarlund Pro-310	495.00	National NC125	199.95	Gonset Communicator 11	229.50
Viking 11 kit	279.50	National NC183D	399.50	Morrow 5BR-1	74.95
Viking 11 factory wired	337.00	National HR060	533.50	Morrow 5BRF-1	67.95
		Hallicrafter S76	199.95	Morrow FTR receiver	128.40
		Hallicrafter SX71	249.95		

Prices subject to change.

Write, wire, phone or visit either store today.

Butler 1, Missouri
Phone 395

Henry Radio Stores

BRadshaw 2-2917
11240 West Olympic Blvd. Los Angeles 64

760, W6LYG 727, USY 416, K6EA 373, W6CMN 269, K6EJT 109, W6FMG 60, ORS 39, BHG 34, GJP 28, MBA 27, MTN 26, CK 16, HIF 9, EBK 6, K6BEQ 2.

SAN DIEGO — SCM, Don Stansifer, W6LRU — Asst. SCMs: Tom Wells, 6EWU; Shelley Trotter, 6BAM; Dick Huddleston, 6DLN. SEC: YFT. ECs: BAO, BZC, DEY, DLN, FJH, HFQ, HRI, IBS, KSI, KCU, WYA. RM: ELQ. The La Mesa Parada de las Flores communications were provided by County AREC members with K6AWZ, DKM, GIX, W6BAO, HFQ, HRI, NLY, and PKX operating on 3825 kc. The Coronado Amateur Radio Club received recognition from the Coronado Recreation Department for services they performed during the 4th of July parade. The Convair Radio Club elected FWF, pres.; UKC, vice-pres.; PKX, secy.; and K6CZE, treas. GVK, president of the San Diego Club, has a new jr. operator. JZA and GRW vacationed to Yellowstone. KYZ and IQM basked in Albuquerque. CEE and OM, HWM, have a new SX-88. UPP vacationed in Oregon and Washington. ORD, former OBS and OO in San Diego, has been transferred to the Naval Air Station, Glenview, Ill. IAB, ELQ, and IZG continue to make BPL month after month. KN6HLQ is a new Novice in San Diego. KNR was very ill part of the summer but is now back on the job. CRT is building new antennas for better DX. OAJ was off work for a month with a back injury. KVB is now mobile on 40 and 75 meters. GBG is waiting for 21 Mc. to open for better DX. UDU, local FCC inspector, enjoyed his vacation at the beach with his family. KN6DF is building a new 75-watt rig and converting a 522 for 144 Mc. QCA has enrolled at California Poly in San Luis Obispo and KJR has enrolled at Pomona College. MUJ was active handling 'phone patches for the Todos Santos Island Expedition. KPU has retired from the Navy and now calls San Diego home. BSD is very active handling service traffic on 20-meter 'phone. Traffic: (Aug.) W6IAB 3392, ELQ 661, IZG 566, K6DBG 44, W6MUJ 34, KVB 22, FCT 12. (July) W6IAB 3682.

SANTA BARBARA — SCM, Vincent J. Haggerty, W6IOX — Just five stations reported this month, which is not a true indication of the section's activity. All stations in the section are invited to report at the end of each month. Please let us know what you are doing. K6CST reports from Pt. Mugu with a fine traffic total; that station monitors 3905 kc. daily from 0900 to 1600 to help others move traffic. QIW and IGH went to the SCN traffic meeting in Los Angeles. IHD enjoyed the Pacific Division Convention at San Jose. FYW reports YCZ will be missed at Paso Robles since moving to the Los Angeles section. Traffic: (Aug.) K6CST 427, NBI 110, W6QIW 49. (July) K6CST 219.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, T. Bruce Craig, W5JQD — SEC: RRM. PAM: IWQ. RMs: PCN, QHL. SBI was elected vice-president of the San Angelo Club. RSV, with CAA, has moved to San Angelo. San Angelo is represented by the fairer sex with BBO. Snyder now has an amateur radio club. CRP is secretary. 5HPV, Dallas, is the former 6HPV, of Los Angeles. The Blue Ridge 160-meter Net meets on 1880 kc. with an 80 per cent attendance record for August. TFB renewed his ORS appointment and made BPL. AHC is going back to school. YKE and TYX have joined the YLRL; TTU is Fifth District Chairman. ZWR has WAC with 45 watts. WN5FBE is a new ham in Commerce; PZH is Superintendent of Schools in Commerce. LGY has a new signal generator. AJ and AJA visited LGY and mother. SQT is building a 200-watt final. ATG is s.s.b. now. Please send me notes of happenings so that we can get it in this column. Thanks to you who have contributed. Traffic: W5TFB 596, KPB 190, AHC 129, UFP 80, PAK 69, YPI 59, ACK 42, CF 38, YKE 31, TFP 30, ZWR 16, LGY 4.

OKLAHOMA — SCM, Dr. Will G. Crandall, W5RST — Asst. SCM: Ewing Canady, 5GIQ. SEC: CKQ. PAMs: SVR, ROZ. RM: GVS. The Lawton-Ft. Sill Club has offered to conduct FCC exams for Novices or Conditional Class applicants. The Enid Club has appointed GVS for the same purpose and he already has given three Novice exams. The ACARC has a lending library of Novice crystals, also a stock of free overtone crystals for v.h.f. Enid has several new hams, ZCN and his XYL WN5EGS, GIQ, and WN5GMB. Can Oklahoma produce a candidate for the Edison Award? How about it, gang? NUT, in Shawnee, is having trouble with local authorities about erection of a 55½-ft. tower. Another old-time ham has hit the front page, 6ZF, Herbert Hoover, jr. Would like to see OO stations with DF equipment to pinpoint those who intentionally QRM traffic with unmodulated carriers. It looks like a real contest is shaping up for Director in the West Gulf Division. KY filed for Vice-Director but was found ineligible by being short of the 4 years membership but is going ahead to manage the campaign for CF. UZG has sold out and gone to California. EHC bought his vertical and is building a new final to match it. RFH has moved to Austin and will be on from there. NPQ has the job of converting his mobile gear

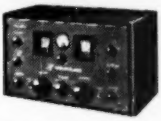
(*Continued on page 124*)

HARVEY ALWAYS HAS IT...IN STOCK For IMMEDIATE DELIVERY

Write for HARVEY'S NEW HAM CATALOG

HAMMARLUND

Model HQ-140-X
COMMUNICATIONS RECEIVER



A new type superheterodyne receiver with built-in power supply for 115-volt AC operation, 50-60 cycles. Covers from 540 kc through 31 mc, in 6 bands. Has band-spread available for the 4 higher frequency ranges, with direct calibration for 80, 40, 20, 15, and 10 meter bands. Other features include: Antenna Compensator—S-Meter—6-position Crystal Filter—AVC—Noise Limiter—Stable BFO for CW—Audio Output approx. 3 watts—High Sensitivity—Standby-Receive Switch and Relay Connections.

Complete with tubes, but less speaker **$264.50**
Speaker in cabinet to match **14.50**
Model SP-600-JX Receiver $1075.00

B&W TRANSMITTER

Model 5100

Complete self-contained amateur transmitter with maximum operating ease and efficiency. Only three tune-up controls: VFO set, final amplifier, and Pi network loading. Single bandswitch selects correct output frequency and Pi network inductance for desired band. Blue-gray steel contour cabinet with recessed touch-latch cover.

Features: • 135 watts phone, 150 watts CW • Self-contained VFO • Covers 80-40-20-15-11-10-meter bands • Rapid bandswitching • Built-in low-pass filter • TVI suppressed • Pi network output.

Complete with tubes **$442.50**

SINGLE SIDEBAND ADAPTER in compact matching cabinet now available for Model 5100 ..... approx. **250.00**

RADIO SPECIALTIES PRE-TUNED 3 Element-20 Meter ROTARY SHORTBEAM

A completely weatherproofed, durable, miniature beam for top 20-meter performance. Elements are individually factory adjusted and pre-set to middle of phone band.

Complete and ready for one-man installation $59.95

Other rotary shortbeams include:

RS-2-20 2-elements—20 meters..**$49.95**
RS-2-15 2-elements—15 meters.. **44.95**
RS-3-15 3-elements—15 meters.. **54.95**
RS-2-40 2-elements—40 meters.. **74.95**

New CENTER LOADING COIL *Cuts Your Antenna Length in Half*

For shortened horizontal wire-type dipole antennas. Matches RG/8U cable exactly.

40 or 80 meters ..... each **$14.95**

KRECO Custom-Built ANTENNAS

CO-AXIAL

A vertical co-axial radiator machined of brass. Matches 72-ohm line. Low angle radiation.

CO-2 for 2-meter band **$14.95**
CO-6 for 6-meter band **19.95**
CO-10 for 10-meter band **24.95**

GROUND PLANE

A vertical ground plane radiator machined of brass (GP-6 and 10 with aluminum elements). GP-2 matches 52-ohm line and GP-6 and 10, 72-ohm with quarter-wave feedline.

GP-2 for 2-meter band **$14.95**
GP-6 for 6-meter band **24.95**
GP-10 for 10-meter band **29.95**

STACKED CO-AXIAL

A vertical, 4-element, co-linear array, machined of brass. Matches 72-ohm line. Very low angle of radiation. Provides extraordinary gain: up to 18db.

SC-2 for 2-meter band **$44.50**

CO-PLANE

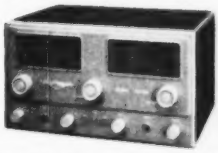
A vertical, 2-element array, machined of brass. Matches 72-ohm line. Higher gain than co-ax antenna alone.

CP-2 for 2-meter band **$24.95**

Note: all Kreco antennas are threaded for standard ¾" pipe and are designed so that feedline is enclosed inside pipe mast (feedline and mast not supplied).

NATIONAL NC-88

World-Master in coverage... World Beater in value



The advanced NC-88 circuit uses 8 high-gain miniature tubes plus rectifier, covers 540kc to 40mc with calibrated bandspread for amateur bands. Built-in speaker; two IF stages; 2 audio stages with phono input and tone control; antenna trimmer; separate high frequency oscillator; sensitivity control; series valve noise limiter; delayed AVC; headphone jack . . . and other features that add valuable performance characteristics to this popular model.

NC-88 complete with tubes **$119.95**

TECRAFT

CASCODE CRYSTAL CONTROLLED CONVERTER for 144 or 220mc

Features:

• High sensitivity • Completely Shielded • Complete stability • Supplied complete with plugs, tubes and crystal • For use with any communications receiver.

Kit form $29.75
Factory Wired & Tested **42.50**

We're Generous On Trade-Ins

If You Want To Talk SWAPS and DEALS write . . . or call W2DIO

NOTE: Prices Net, F.O.B., N. Y. C. Subject to change without notice

HARVEY is known the world over . . . wherever Hams operate . . . as a reliable source for Ham Equipment . . . assuring fast service and prompt deliveries.

Harvey RADIO CO., INC.
103 W. 43rd St. New York 36, N.Y. • JUdson 2-1500

to his new 12-volt Olds. EHJ, a schoolteacher, has a workshop after school hours in his classroom, with permission of the school. Last year ten boys and one girl studied for and obtained Novice Class licenses. This year most of them are back working toward Class B licenses, in addition to 28 new students. Because no school funds are available equipment is limited. The transmitter is a 10-watt peanut whistle and a receiver is very much needed. Traffic: W5GVS 288, QAC 85, PML 41, TNW 36, ADC 29, REC 26, ESB 18, KY 14, SWJ 14, DAX 12, UCT 12, FEC 9, PNG 9, MFX 8, EHC 4.

SOUTHERN TEXAS — SCM, Dr. Charles Fermaglich, W5FJF — FJX is back in San Antonio and on 75 meters. CUL has a TCS working 40- and 75-meter 'phone and 80-meter c.w. OBA has a 458 on s.s.b. He claims it is the best thing since the vacuum tube. RWS is going s.s.b. with a 458 VFO. UGK has a new mobile noise clipper of his own design. WYU is going to town with his mobile. IZB is on 40 and 75 meters and 160-meter mobile. DGA has a new Viking on 20, 40, and 75 meters. FJF is doing FB with new 1-kw. rig. New officers of the HARC are FJF, pres.; VWF, vice-pres.; Sam Dixon, secy.; CE, treas.; ADZ, membership chairman; UMC, program chairman. The National Guard station, OVT, spent two weeks at Ft. Sill, operated by ZBK and RVI and sent approximately 60 messages into Houston, the XLI Corps Artillery Hg. & Hg. Btry. home town. Forty-five messages were 'phone patches. SJK and his XYL, Audrey handled most of this traffic; others who helped were TIJ and VCE, who monitored the frequency. Other operators with the unit at Ft. Sill were LSF, RSJ, WKL, and NOT. New officers of the GCARC are VUS, pres.; BPY, vice-pres.; DLS, secy.-treas. The annual installation banquet was planned by AUN and BPY. FJF was guest speaker and gave a talk on public relations. ULN was awarded a $25 prize for being the most valuable member and for faithful attendance. BPH received a grid-dip meter for obtaining the most new members. VUS was instrumental in obtaining a house and land for a club house. WN5GKD is a new Novice and full member of the Club. Fred Peneto got General Class license and is on 20 meters. KXA and DJD are publicity agents. Traffic: (Aug.) W5MN 854. (June) W5MN 640.

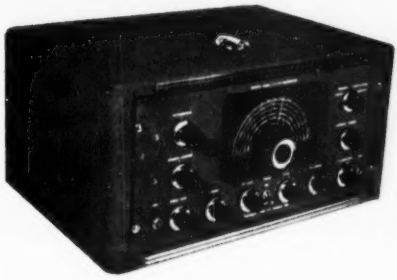
NEW MEXICO — SCM, G. Merton Sayre, W5ZU — SEC: KCW. RM: JZT. PAM: BIH. V.H.F. PAM: FPB. New Mexico monitors 3838 kc. daily for the benefit of touring mobiles. NMEPN meets Tue. and Thurs. at 1800 MST. and Sun. at 0730 MST on 3838 kc. The Breakfast Club covers 3838 kc. daily from 0700–0900. The New Mexico C.W. Net on 3633 kc. started fall sessions on Sept. 13th with JZT acting as NCS. Portales hams voted to form a club at a meeting Sept. 3rd. HJF, SOV, LWH, VOK, NQR, AWR, MCL, ZCV, and WN5s CVH and FSR attended along with 7 hams from Roswell. The New Mexico Amateur Radio Caravan Club helped with communications at the Sport Car Races at Fort Sumner on Sept. 12th. VWU and WIY sent in a report of traffic handled on 144 Mc. and are holding daily skeds between Albuquerque and Roswell. AHQ made BPL on 20-meter skeds. DWT will be out of the State until January. BRX is moving to the Northwest. Traffic: W5AHQ 680, K5NRX 116, W5BTB 32, ZU 29, BZB 19, DWT 7, BAG 6, CEE 4, GEM 4, VWU 3, WBC 3, WIY 2.

CANADIAN DIVISION

MARITIME — SCM, Douglas C. Johnson, VE1OM — Asst. SCM: Fritz A. Webb, DB. SEC: RR. PAMs: VE1OC, VO6N. ECs: VE1DQ, VO6U. New appointees: VE1BL, VL1QM, VO6X, and VO6AH as OPSs; VO2G as OO. We regret the passing of XR. Ralph had been in ill health for a long period but remained active and enthusiastic while operating from his bedside. 3DBD (ex-1SP) was a recent visitor to Halifax. John Ball (ex-G2DKX) is now AV. IL has been active from his summer home in N. B. on 80-meter c.w. ADM now is located at Dartmouth. OO appointee BN has been a consistent reporter. ZZ took top honors in this section for c.w. and 'phone in his first CD Party in July. HC recently went maritime mobile on 3.8-Mc. A3 with the assistance of LZ and his garbage scow. The Crossroads of the World ARC of Gander executives are VO2CM, pres.; VO2G, secy.; VO2F, treas. VO2G reports there are 14 active and enthusiastic members. The N.B. Amateur Radio Assn. had its first get-together at Fredericton in August at which 100 people attended and drew up a constitution. EC VO6U reports the Goose Bay gang is building 10-meter rigs for the C.D. Net. VO6N received WAC in July. Traffic: (Aug.) VO6N 489, VE1FQ 295, K2DZP/VO2 230, VE1AAW 107, VO6B 95, VO6U 83, VE1ME 46, VO6AH 15, VO6X 13, VE1ZZ 8. (July) VE1ZZ 4.

ONTARIO — SCM, G. Eric Farquhar, VE3IA — With this section reverting to standard time and vacations just a memory, ham radio settles down to winter activity. CP sends in the first report in a long time from the new QTH, Brantford. The mobile picnic held on Lake Erie with the Norfolk County Radio Club as host was a humdinger; likewise the joint picnic held at Cobourg by the Quinte Club of Belleville and the North Shore Club of Oshawa was very successful. The change of antenna direction at BUR

(*Continued on page 186*)



100 WATTS

Peak Envelope Power Output

Presenting the new Elenco 77, a complete bandswitching SSB transmitter-exciter, with built-in VFO and voice control circuits, including speaker control.

Designed to meet commercial specs regarding signal characteristics. Advanced design is used throughout in the Elenco 77, to provide a new concept of transmitted bandwidth, unwanted sideband attenuation, and carrier suppression.

All functional controls are on the front panel, providing maximum operating convenience.

ADDITIONAL FEATURES:

- 80 db unwanted sideband attenuation, 100 db carrier suppression; the triple cascade crystal filter guaranteed for the life of the unit
- Unwanted sideband suppression and carrier attenuation are fixed and require no maintenance or adjustment.
- Unwanted sideband distortion products down 80 db at 10 watts, down 35 db at 100 watts output
- Transmitted bandwidth 2.7 KC at the 6 db points. Audio response 300–3000 cps at the 6 db points, down 60 db at 3500 cps
- Bandswitching 10, 15, 20, 40, 80, and 160 meters, with provisions for AM and CW operation on all bands
- Crystal controlled mixer stages provide high order of stability on all bands; also provide for sideband switching
- Calibrated VFO with vernier frequency control for zeroing frequency. VFO covers 200 KC on all bands. Full 10 meter coverage by using separate mixer crystals. Thermal frequency stability .01% or better.
- Very ruggedly constructed, cabinet 16 ga steel 21" wide, 15" deep, 10½" high; standard relay rack panel ⅛" steel, 8¾" x 19"
- 20 tubes, including 3 rectifiers and one VR tube

ELENCO 77, Complete: **$595.00**

COMING SOON — A matching KW linear amplifier

See your distributor or write to Paul Wright, W9OHM, at

ELECTRONIC ENGINEERING CO., WABASH, IND.

brings good results. Visitors at the cottage of AJR were W8HBH, IEA, GCA, BNC, W9DOK, VE3BZP, DDA, and KM. Nice reports following vacations were received from GI and VD. The ham radio exhibit of the Grey-Bruce County Radio Club at the hobby show of the Rover Scouts held in Kincardine Town Hall was the scene of much activity. The club president extends thanks to all for assistance during the three-day affair. Congratulations are in order to hard-working ATR on making the Brass Pounders League this month with over one hundred originations. BSW attends to OO duties between rebuilding and painting jobs. OBS endorsement to BXF and RM and ORS endorsements to DU were pleasant tasks this month. Hope all vacationers benefited from various trips this year and that all are put in good stead for bang-up fall and winter operation at ham radio plus an increase in reports to your scribe. Traffic: VE3BUR 245, ATR 209, TM 69, IA 63, AJR 57, DQX 54, EAM 52, AUU 36, NO 30, DFE 26, GI 25, VZ 25, CP 16, AOE 8, BPN 7, DSQ 7.

QUEBEC — SCM, Gordon A. Lynn, VE2GL — PV works a remote-controlled miniature airplane on 10 meters. VE is back on 2 meters. It is with regret that we record the death of ALF. CA reports routine operating on 20 meters with nothing new or strange. AEV is on 75-meter 'phone from Malartic. PQN is picking up activity with cooler evenings, and again interested stations are invited to report in on 3670 kc. at 7:15 each evening. Traffic: VE2BB 79, CA 70, DR 39, EC 28, LO 7, ATQ 6.

ALBERTA — SCM, Sydney T. Jones, VE6MJ — WC visited the U.S.A. on a combined business and vacation trip. OD vacationed in Vancouver. HM visited friends in Winnipeg. NX has been working his share of DX on 14 Mc. JJ has returned home after an extended trip to British Columbia. PS plans on increased power. ZA and WO now are working 144 Mc. TG checked the Alberta 'Phone Net while PV was on vacation. MB attended summer school in Edmonton and informed MJ he would be back on the air in the fall with a new rig. WB took to the air and visited the north country for business as well as pleasure. JP and family vacationed in Jasper and visited YE and XYL. VE8OB was a visitor in Edmonton and picked up a new rig before returning to the north for the winter. GW is reported to have lost his 14-Mc. beam in a recent storm. WS and his XYL made a trip to the U.S.A. Now that the fall season is here, gang, how about a few more check-ins on the Alberta 'Phone Net. The frequency is 3765 kc. at 1730 Mon., Wed., and Fri. Traffic: VE6WC 61, OD 40, HM 20, YE 20, MJ 11, NX 3.

YUKON — Highlight of August was the Duke of Edinburgh's visit to Yellowknife when he spoke to the Polar Net over VE8RZ and RZ is to be commended for his handling of the affair. RZ is continuing the Polar Net now that GY is QRT after a year and 8 full log books. GY operators 1QJ, 2GY, 3AAS, and 3BUO are back home with TVI and BCI but enjoyed their stay in VE8-Land. OB is a new call at Cambridge Bay. MW can be heard on all bands from there, also. PK divides radio with his new color camera. NG returned to Baker with his bride. SE has left to study in England. SO puts out 250 watts from the Clyde River. SW has a new rock for the Net on 14,320 kc. GY gets ham teletype signals to 6KF. SQ is a new call at Aklavik on 80-meter c.w. PH now operates VE6 portable. W3VYR is back and will be VE8 portable. Bob Williamson, former SCM, is now at Yellowknife. We need an SCM badly, so let's start the necessary petition to nominate someone for the position. That VE8 column looks good in *QST*. Until we have an SCM, send news for *QST* via VE8RZ or VE5HR.

MANITOBA — Leonard E. Cuff, VE4LC — Acting SCM: Mrs. Jean Morley, 4JM. We regret the passing of DJ, HL and OS, mobile, were heard picnicking at Delta Manitoba. 5GO visited AI, JM, AO, RK, and QD. HL, mobile, was heard visiting Brandon and Killarney. KG called on RB. JY made an extended trip, calling on AY, RB, EY, and BD en route. RK is always there in a pinch when the nets have emergency traffic for Brandon. NW has been operating mobile at Gull Lake when not pouring cement for the new cottage or pouring blueberries into his interior. KN, mobile, was heard operating on the return trip from the U.S.A. HP is back on with a new antenna. Dauphin entertained at the banfest Sept. 6th. IB is holidaying at The Pas. WW is back on and handling traffic on the nets. PA was heard from XP while visiting in Dauphin. JM has returned home after spending the summer holidays at AI's QTH in Binscarth. Traffic: VE4AI 86, GE 49, HL 28, AO 17, IF 14, RB 12, XP 10, NW 7, GB 4, WW 4, AY 2, EU 2, JW 2, KG 2, QD 2, VE5GO 2, HS 2, JK 2, VE4OS 1.

SASKATCHEWAN — SCM, Harold R. Horn, VE5HR — About 15 amateurs gathered at Rosetown with W7OVU/mobile and his XYL and family as guests. General Worthington, National Director Civil Defense, was full of praise for the demonstration put on for him during his stay at Saskatoon. CDHQ station, 5AA, had YF at the controls and mobiles DR, FY, RL, UC, W7OVU/VE5, EH/p, and CW at Regina taking part. Press reporters present gave the public a first-class write-up. EO now has 110 watts to 807s. BD is a new call in Saskatoon. KD has his 'phone ticket. IE is back on after 7 years with a Viking II and VFO. GO visited the Brandon gang. 3DNF, ex-5KQ, visited out West.

(Continued on page 128)

it's Lafayette for YEAR ROUND BUYS

3 LENS TURRET MICROSCOPE

7.45

100X-200X-300X

Precision built for accuracy and long lasting service. Triple position turret holds 3 achromatic color-corrected objectives for magnification of 100X, 200X and 300X power! Heavy base and stand—inclines through 90°. Dual knob focusing by rack and pinion. Adjustable plane sub-stage mirror. High-grade microoptics used throughout! Complete with fitted wooden carrying case and slides. Shpg. Wt. 4½ lbs.

F-10 ..... NET 7.45

Lafayette Greatest Tape Buy Ever!

1200 FT. REEL
Genuine Plastic Base
RECORDING TAPE

$1.89 per roll plus postage (6¢'s accepted)

LAFAYETTE made a terrific deal with one of the leading manufacturers of recording tape to supply us with their regular tape which sells for almost twice our price. WE GUARANTEE ABSOLUTE SATISFACTION OR YOUR MONEY BACK. The finest, professional-quality recording tape obtainable. Highest performance for thousands of playings. Red Oxide Base in a smooth, uniform coating; greater signal strength; with maximum fidelity; uniform frequency response from 40-15,000 cps.

PRECISION DRAFTING SET

$2.75

11 Pieces—Fitted Felt-Lined Case

Made in Germany, of heavy brass, nickel plated and polished. Instruments include 5½" Compass with pencil and pen points and lengthening bar. 5½" Divider, three 3¾" sidewheel bow dividers with needle point, pen point and pencil point. 5" Ruling pen, extra handle for pen or pencil, capsule with extra leads. Interchangeability of these many parts makes this an exceptionally versatile set. Your money back—if this set is not worth twice our price!

F-13 ..... Net 2.75

LAFAYETTE MICROPHONE

3.95

- Western Electric Magnetic Head
- UTC Ouncer Transformer

A terrific value! High impedance mike with —55 db output level. Compact, modern, slim styling. Contains W.E. 253A magnetic head and UTC ouncer. Silver plastic casing with detachable desk stand. Lightweight — only 11 ounces. Complete with 6 ft. cable.

PA-23 ..... Net 3.95

FREE! BARGAIN CATALOG

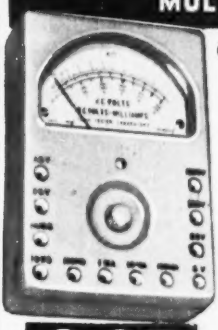
WESTERN ELECTRIC HEARING AID

Best Buy

Reg. price $185.00* Our price $14.95

Brand new, in original Western Electric's jeweler's case. Supplied with receiver, receiver cord, battery cord and plug (less batteries). Money back guarantee. Act now while they last! Uses Burgess XX30E and 8R batteries at $1.55 per set.

NEW POCKET AC-DC VOM MULTITESTER



9.95

QUANTITY IS LIMITED!

This instrument is one of the best buys that Lafayette has ever offered in a Wide Range AC-DC MULTITESTER. An ideal portable unit that meets the need for a compact, yet rugged test instrument. Has ease of operation usually FOUND ONLY IN MORE EXPENSIVE INSTRUMENTS. Has 1000 ohms/volt sensitivity on both AC or DC. Uses full 2" rectangular meter with large, easy to read scale. Uses 1% precision resistors, jeweled D'Arsonval microamp meter movement. Ranges: AC-DC and output volts 0-5, 0-25, 0-250, 0-1000V; DC current 0-1, 0-10, 0-100. Resistance 0-10K and 0-100K ohms. In handsome sturdy bakelite case. Size: 4⅝" x 3¼" x 1⅝". Supplied Complete with test leads and batteries. A Must for every serviceman, shop, Laboratory or experimenter—and at Lafayette's Price you can afford to own one. Shpg. Wt. 2½ lbs.

MODEL RW-27C—Complete
In Lots of 3 9.45
Single, ea. 9.95

Top Quality CRYSTAL MIKE

$5.75

- —52 db output level
- Range 30 - 10,000 cps
- 10 ft. cable and connector
- Handle and interlocking base

A really fine microphone by a manufacturer known the world over. Use for amateur broadcasting, public address and home recording. Can be used with floor stand. Shpg. wt. 2⅝ lbs.

PA-21 ..... 5.75

SONOTONE 9980-S

TURNOVER CERAMIC PHONO CARTRIDGE WITH DUAL SAPPHIRE NEEDLES

REPLACEMENT FOR COLUMBIA 360—VM—WEBSTER AND CRESCENT RECORD CHANGERS

SPECIFY STOCK NO. PK-40

3.50 In lots of 3, each
Singly, ea. 3.98

Lafayette Radio

DEPT. VK

NEW YORK, N. Y.	100 Sixth Ave.
BRONX, N. Y.	542 E. Fordham Rd.
NEWARK, N. J.	24 Central Ave.
PLAINFIELD, N. J.	139 West 2nd St.
BOSTON, MASS.	110 Federal St.

Include postage with order

3PH/mobile and his XYL visited HR. AJ and HR won top honors for c.w. and 'phone in the World-Wide DX Test. 8RW and 8NG and his bride visited Saskatoon. 6FF and HR reminisced on their Arnprior trip. DR, FY, YF, HR, and W7OVU and families spent the holidays at Emma Lake. HR took an unexpected swim fully clothed when he tipped the canoe. Is your certificate due for endorsement? Send it in and avoid cancellation. Traffic: VE5RE 30, BZ 25, HR 19, YF 17, BF 10, KG 8, QL 8, GO 2.

Multiband Final

(Continued from page 18)

the condenser. As can be seen from the photographs, the condenser is mounted on an auxiliary plate, and the plate is fastened to the stand-offs. This is not necessary, but is the result of a change in plans while building the unit. When it was decided that the rig would never be modulated with more than 1000 volts on the plate, the originally-installed condenser was removed, and the present one with double the maximum capacity was substituted. The auxiliary plate, therefore, is an adapter.

Wherever possible, copper strap is used in the plate tuned circuit. In the screen circuit, the by-pass condensers, which have small-diameter leads, are two units in parallel so that the r.f. current in the circuit will be shared by the two.

A comparison of the photographs and the wiring diagram of the pi-network loading circuit will show a discrepancy in the number of fixed condensers. While building the amplifier, it seemed to be desirable to operate the rig occasionally with a minimum of loading. However, after satisfying the initial curiosity as to how far the plate current would dip with no load, two of the condenser banks have served no purpose whatever. The diagram shows a fixed 0.001-μf. condenser, whereas two 680-$\mu\mu$f. units in parallel make up the first fixed condensers switched into the loading circuit.

All the wiring in the amplifier, except that which is supposed to be "hot" with r.f., is done with shielded wire by-passed to ground at each end with ceramic condensers. All shafts passing through the front panel are broken with insulated couplings. This is done to prevent the shaft from acting as a small antenna — a possibility, since the shaft has a lubricant between it and its bushing, and lubricants usually are not good conductors.

Adjustment

When first tuning up the amplifier, the neutralizing condenser was adjusted for minimum reaction on the grid current when the plate circuit was tuned through resonance, and with no plate or screen voltage applied. Later, when full power was applied and the tube loaded to full output, the neutralization was touched up so that as the plate circuit was tuned through resonance the grid current peaked and the plate current reached minimum at the same setting of the plate tuning condenser.

It was found, while making the initial checks on 10 meters, that there was an amazing drop-

(Continued on page 130)

For a Ham's Xmas!

DO YOUR XMAS SHOPPING EARLY, BY MAIL!

WORLD TIME CLOCK

AUTOMATIC, ELECTRIC 24-HOUR CLOCK WITH HUGE 10" DIAL, SWEEP SECOND

AT A SINGLE GLANCE this fabulous clock tells your favorite Ham the exact time in every zone of the world. Key cities and countries are shown on inner dial. 0100-2400 hours and 1-60 seconds are shown in separate bands! Gray metal with chrome-plated bezel. Self-starting. Convex crystal. A unique clock of time-proven quality at a modest price that HASN'T risen with inflation! *Order No. 32-870-Q.*

ONLY **$12.50** *Plus $1.25 U.S. Tax*

REG. $18.50 FAIRCHILD 1/4" DRILL $9.95

LOWEST price for a famous-make ¼" electric drill we've seen in a blue moon. Brand new FAIRCHILD "Electric Industries" drill with die-cast aluminum pistol grip and gear case, trigger switch with side locking button, 6½ ft. rubber cord. Fairchild's world-famed 1/10 hp 110-120V AC-DC motor delivers no-load 1200 rpm, full load 700 rpm. Hobbed steel spur gears, armature wound with triple formex wire. 3-spring-collet hand chuck (also available with geared Jacobs chuck, see below). Ship. wt. 3 lbs. **Order No. R-5170**

WITH GEARED JACOBS CHUCK:

Above Fairchild ¼" drill with the fabulous Jacobs geared chuck including gear key and rubber holder which holds key onto drill cord! Anyone who knows the regular price of this precision chuck can see the savings. Anyone who knows prices will tell you a drill with this chuck has never sold this low! Ship. wt. 3 lbs. **Order No. R-5270.**

$13.44

REG. $2.50 ACCESSORY KIT!

Sander-polisher kit for Fairchild or other drill. Includes: lambs wool bonnet, molded rubber disc, sandpaper, countersunk screw and other requisite hardware. Ideal for use with furniture, cars, silverware, hobby and shop, metal, plastics, drill press, lathe, etc. Ship. wt. ½ lb. **Order No. R-5270.**

99¢

13 PIECE TWIST DRILL SET!

Shown in metal Huot index (optional at extra cost). 13 chrome vanadium drills from 1/16 through ¼" in 1/64 divisions! Way off price! Drills only, 98c, **Order No. R-5215.** Heavy gauge index has marked compartments for above drills, 2 hinged panels, and cover! Worth twice our **61c** price, **Order No. R-5216.** Each ½ lb.

98¢ LESS INDEX

4 ALBUMS OF POP MUSIC ON 45 RPM

Reg. $15.68 Value

All 4 for $6.95

Order No. R-7054.

Here's a real bargain with savings of nearly $9 — while they last. FOUR brand new MGM 45 rpm 4-record albums — 16 records — 32 sides:

MEL TORME SINGS: Love You Funny Thing, A Little Kiss Each Morning, A Cottage for Sale, I Cover the Waterfront, The Best Things in Life, I Can't Give You Anything but Love, Little White Lies, County Fair. 4 records, MGM album K 79.

LOVELY TO LOOK AT: Kathryn Grayson, Howard Keel, Ann Miller, Marge and Gower Champion, Red Skelton, Carmen Dragon Orchestra. The wonderful songs from the screen version of Roberta, recorded directly from the MGM sound track. Songs: Lovely to Look At, Smoke Gets in Your Eyes, The Touch of Your Hand, I Won't Dance, Lafayette, You're Devastating, Yesterdays, I'll be Hard to Handle. Music by Jerome Kern. 4 records, MGM album K150.

RAYMOND SCOTT: the brilliant Raymond Scott and his orchestra play music for listening and dancing, magnificently orchestrated. Selections: Two Guitars, Huckleberry Duck, Manhattan Serenade, Tired Teddy Bear, Rub-Dub, Jackrabbit, Estrellita, Coming Down to Earth. 4 records, MGM album K75.

WALTER GROSS PIANO: one of America's keyboard kings plays 8 songs by Vincent Youmans: Orchids in the Moonlight, Through the Years, More Than You Know, Tea For Two, Without a Song, I Know that You Know, Sometimes I'm Happy, Time On My Hands. Walter Gross at the piano with rhythm accompaniment. 4 records, MGM album K114.

These 4 albums comprise the ideal gift package for your favorite pop music listener and the well over 50% savings make it easy for you to play Santa Claus. All albums brand new, 1st quality! Ship. wt. 2½ lbs. Order No. R-7054.

RADIO SHACK
CORPORATION
167 Washington St., Boston 8, Mass.

off in efficiency while going from 28.0 to 29.7 Mc. This was found to be due to a self-resonance in the variable inductor in the high end of the 10-meter band when all of the coil was shorted out. This was cured by putting a permanent short across four turns of the inductor. This caused no drop in efficiency or trouble with coil rotation, since, even on 3.5 Mc., only half the coil is used, and the permanent short is placed in the unused portion — at the end of the coil, in fact.

It had been expected that the unshielded 6Y6 in the plate-circuit compartment might produce some feed-back to the grid circuit. This did not prove to be the case, probably because the leads to the grid and plate of the tube are shielded.

In operation, there is a barely noticeable drop-off in efficiency at 28 Mc. as compared to the lower frequencies. The clamper tube reduces the plate current to 35 ma., which is far below the maximum permissible when operating from a 1000-volt plate supply. It has been impossible to make the amplifier take off on an oscillation at any grid-drive value from zero to normal, or at any tuning settings. And finally, the TVI situation is under control when operating this amplifier and feeding the antenna through a low-pass filter.

The Lazy Man's Panoramic Adapter

(Continued from page 16)

ceiver, couple it to the antenna post of the BC-453, and tune the BC-453 until a deflection is obtained on the 'scope. You will probably have to tune it higher than the calibrations would indicate, because of the effect of the reactance modulator.

Advance the sweep width control and check sweep action. It should be possible to move the signal generator frequency over a range of 30 kc. (plus or minus 15 kc.) while the signal peak moves from one edge of the base line to the other. If you try to get more sweep width than the unit can handle, the deflection peak will become very wide near the edge of the screen, indicating loss of linearity. Should you find that the peak doubles up near one end of the trace, simply adjust the horizontal position control of the 'scope until this condition is shifted outside the useful area of the screen on that side, and increase the horizontal gain at the same time to retain the desired deflection toward the opposite side.

The remaining sweep range should be about 30 kc. Too little sweep width may be due to a weak 12SK7 in the reactance modulator. It may also be possible to gain a few kilocycles by changing the value of the 12SK7 cathode resistor (R_1) to 1500 or 2500 ohms. In all of the above checks, the height of the signal peak may vary considerably as it moves across the screen.

With the signal generator set again at the i.f. of the station receiver and the peak centered on the screen, adjust the r.f. and antenna trimmers for maximum amplitude of the peak. It may be that some shifts in the oscillator trimmer and

(Continued on page 132)

main tuning adjustments will be required for all peaking adjustments to fall within range of the trimmers. When peaking has been completed, connect the free terminal of coupling capacitor C_2 that was left open earlier. After this, the signal should peak up at two places on the screen.

In the station receiver, install a 10-$\mu\mu$f. condenser between the plate of the converter (first detector) tube and a coaxial socket mounted as close to the tube as possible. Exposed leads here should be short, to prevent stray pick-up of the receiver's b.f.o. or other signals. Extend a coaxial cable (not more than a few feet if possible) to the antenna terminal of the BC-453. Signals from the station receiver should now appear on the screen.

Tune in a steady carrier on the receiver and observe how it changes in size as the receiver is tuned and it moves across the screen. (NOTE: The receiver a.v.c. should be turned off.) For final adjustment of the trimmers in the BC-453, set the antenna trimmer for peak response when the signal is near one edge of the screen, then peak the r.f. trimmer when it is near the opposite edge. Some juggling should produce a fairly uniform response with a total amplitude variation of not more than two to one.

Operation

1) If the receiver's a.v.c. is left on, the amplitude of all signals on the 'scope will drop when a strong one is tuned in. This can be avoided by removing the a.v.c. from the receiver's r.f. stages, but then the S-meter calibrations will change.

2) If you want to analyze someone's signal for splatter, etc., be sure the gain of the BC-453 is reduced to the point where the carrier is well below the saturation point on the 'scope.

3) The i.f. circuit of the BC-453 is only 2 or 3 kc. wide, so the effects of modulation will appear differently depending on the audio frequency involved. In general,

a) Low frequencies (below 1000 cycles or so) will show up as convolutions of the signal peak.

b) High frequencies will show up as separate sidebands outside the carrier peak.

c) Because of the above, a 100 per cent modulated signal on voice will seldom appear to fill the carrier peak down to the base line.

4) Always synchronize the sweep rate of the 'scope to the power line frequency (either at 20, 30, or 60 cycles) using external sync on the 'scope.

The writer wishes to express his thanks to Gus Schnetzer, W2ICA, for his work in constructing the first model of this circuit and for his encouragement in the preparation of this article.

ARE YOU LICENSED?

• When joining the League or renewing your membership. It is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

24 HOUR SERVICE ON ALL STOCK ITEMS

Uncle Dave's Radio Shack

DIVISION OF
FORT ORANGE RADIO DISTRISUTING COMPANY

24 HOUR SERVICE ON ALL STOCK ITEMS

Hey hams – send in some orders. Uncledave's due back from fishing this week and he'll need money to buy a string of fish. We've got everything for for the ham (except fish). So call Uncledave W2APF if you want any problems solved.

JOHNSON VIKING II

$279.50

(In Stock)

Kit, complete with tubes—less crystal, key and mike.

Wired and Tested, $33".50

We've got the new
20 METER SHORT BEAM
pretuned 3 element
price **$59.50**

CENTRAL ELECTRONICS

Single sideband equipment

20A $199.50 k
249.50 w/t

★ ★ ★ ★

Slicer 49.50 k
74.50 w/t

★ ★ ★ ★

QT–1 Trip
12.50 w/t

★ ★ ★ ★

VFO for 20A
Surplus converted
62.50

NATIONAL NC98, Receiver

$149.95

Speaker $11.00

Mobile Special

NEW SHIPMENT

Hand mike, single button carbon. Complete with cord and plug. Finest made.

$2.50 ea.

Post Paid
Dozen lots, $25

PARTIAL LIST OF USED EQUIPMENT

Sonar MB611	$ 25.00
Sonar FM Exciter	45.00
Morrow 3BR	45.00
MM-1 Micro Match	30.00
Web 10 Meter, 25W Xmitre	25.00
National 5886, power supply	25.00
Thordarson 100W. Transmitter	95.00
Collins 32V3 (Demo.)	695.00
National NC183D, with speaker	295.00
RME, DM30X	20.00
LaFayette VHF converter	25.00
2 Eldico, TR75-TV ea.	50.00
WRL, Globe Trotter transmitter	65.00
Meissner Analyst	50.00
Rider Chanlyst, with UHF	75.00
Gonset Tri-Band	30.00
Hammarlund 420 & 411	95.00
Motorola, FMT30DS, complete	150.00
Jackson 109 (VTVM)	35.00
Collins, 32V2, Converted from 32V1	450.00
Motorola 10M transmitter, with cables	50.00
Lysco 600, new condition	115.00
National SW54	35.00
Hallicrafter SX42 with R42 speaker	170.00
BC221 Frequency meter, perfect	125.00
Hallicrafters S41G	25.00
Gonset 2 M. converter	25.00

FOREIGN TRADE SOLICITED

Write for highest trade-in offers. We want your used equipment for trade or cash!

Collins 32V-3 Transmitter

$775

VFO Controlled, Bandswitching, Gangtuned. Covers 80, 40, 20, 15, 11 and 10 meters; 150 watts CW; 120 watts phone; entire RF section enclosed in metal shield. (In Stock)

COLLINS 75A-3 RECEIVER **$550**
With Mechanical Filter and Speaker

Folded dipole amateur antennas 300 ohm (kilowatt cable) each cut to band length 75 ft. lead-in.

10 meter 28 mc, 20 ft.	$3.00
20 meter 14 mc, 36 ft.	4.50
40 meter 7 mc, 68 ft.	5.85
80 meter 3.5 mc, 134	8.45

GONSET COMMUNICATOR

2-Meter Transmitter Receiver

Model 3026	Model 3025
$209.50	$229.50

Operates from either 115-Volt AC or 6-Volt DC source.

TELREX 520 BEAM

$55.00

Also other Beams

ELINCOR

2 meter	beams
200EA	$ 9.24
210EA	21.45

ANTENNA ROTATOR SPECIAL

Will hold up to 200 lbs.

$29.95

Complete with 100 ft. 4 Cond. Control Cable

JOHNSON RANGER

$179.50 kit l.t. $258. w/t l.t.

★ ★ ★ ★ ★

TUBES extra, $23.

CABLE SPECIALS

4 cond. rotor	per 100'	$2.50
RG 59/U 6c ft.	per 100'	4.00
RG 58/U 6c ft.	per 100'	4.00
RG 8/U 14c ft.	per 100'	9.00

Kilowatt twin lead, clear poly insulated. 12 ga. cond. 9c ft.
100' $9.00

Fort Orange RADIO DISTRIBUTING COMPANY
904 BROADWAY, ALBANY, N. Y.
TELEPHONE ALBANY 5-1594

Transistor Superregen

(Continued from page 17)

receiver using superregeneration, but the power input to the transistor receiver is only one-twentieth that of a two-tube battery-operated superregenerative receiver. The total drain is only 3.4 to 4 ma.!

Two 7.5-volt "C" batteries were used to power this receiver, the taps being taken off where necessary. The test points shown in the photographs were provided to measure currents in the various elements.

With this little job on the receiving end, contacts were made with W4FBL, Jacksonville, Fla., on 6 meters, and with several 10-meter mobiles at a recent demonstration of transistor equipment at the Morris Radio Club, Morristown, New Jersey.

Public Relations

(Continued from page 20)

into newspapers without too much trouble. However, if you can tie your Proclamation in with another local event or with a "gimmick," you have (1) more of a chance of making the news and (2) just as important, less of a chance of the picture, write-up, etc., being pulled out of later editions should sudden news develop. Incidentally, your publicity is made more effective and so are your "tie-ins!"

Newspapers should be contacted either by personal visits to the editorial department or by sending simple, direct letters informing them of your plans, etc. It is well to contact them a number of times: first, when definite plans are officially announced; and also as each phase of the plan is about to occur. In Baltimore, we have two daily newspapers. As I work for one and the XYL of John, W3PKC, works for the other, the papers were well supplied with copy.

How did we make our contact with WFBR? Well, Phil Crist is a well-known announcer in this area and has been with WFBR for many years. Phil is also known as W3NNX — he made the contact for us! Generally speaking, when you realize the number of hams working in radio, it should not be too difficult to get time on b.c. stations. The same for TV.

Often, friendship at a time like this comes in handy. Marx, W3IUC, was personally acquainted with the special activities director of WMAR-TV. Newsreel coverage was promised and delivered!

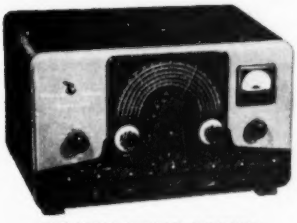
To get on the quiz program "Shadow Stumpers" on WBAL-TV we simply wrote a letter to the producer telling him of Amateur Radio Week, etc., and an invitation was quickly extended. Just as a "tie-in" is used in announcing the Proclamation (officially), so, too, do many radio and TV programs grasp at just such an opportunity to give extra timeliness to their shows.

This was Amateur Radio Week in Maryland. We do not say this is all we could have done to

(Continued on page 136)

"P-sst! No, No, Senator, Walter Ashe Has Already Done That."

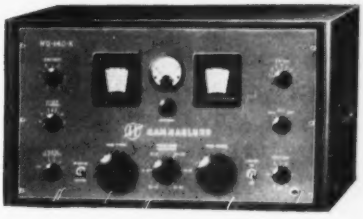
Assuring you of a bargain price on the receiver of your choice is no "campaign promise!" Our special "Surprise" Trade-In offer on used (factory-built) test and communication equipment is an absolute guarantee of real money saving. Prove it for yourself. Trade used equipment now. Wire, write, phone or use the convenient coupon.



JOHNSON VIKING RANGER TRANSMITTER-EXCITER KIT.
Less tubes. Net $179.50.
Wired and tested. Net $258.00.
Set of tubes for Ranger Net $23.92

NATIONAL HRO-60
Less Speaker. Net $533.50

COLLINS 75A-3 with 3 KC Mechanical Filter. Less Speaker. Net $530.00



HAMMARLUND HQ-140X. Less Speaker. Net $264.50

HALLICRAFTERS SX-88. Less Speaker. Net $595.00

All prices f. o. b. St. Louis • Phone CHestnut 1-1125

---FREE CATALOG! Send for your copy today.---

WALTER ASHE RADIO COMPANY Q-11-54
1125 Pine Street, St. Louis 1, Missouri

☐ Rush "Surprise" Trade-In offer on my_____

for_____
(show make and model number of new equipment desired)

☐ Rush New 1955 Catalog

Name_____

Address_____

City_____ Zone_____ State_____

Walter Ashe RADIO CO.
1125 PINE ST. • ST. LOUIS 1, MO.

promote amateur radio. As we got into committee meetings there occurred other suggestions which, too late for this year, can be incorporated in next year's plans. We hope that you, reading this, will be encouraged to have an Amateur Radio Week in your state and that some of the ideas expressed here may aid you in your plans.

In closing, let me repeat what our committee has heard many times — a "week," like anything else, is just what you make of it! When you have obtained your Governor's proclamation, consider it in one sense as a blank piece of paper. Then let your activities, your energetic public relations program spell out the words!

Distortion in S.S.B. Linears

(Continued from page 28)

method uses a receiver, such as the 75A-3 with the 800-cycle mechanical filter, that has sufficient selectivity to separate the frequency components of a two-tone test signal.

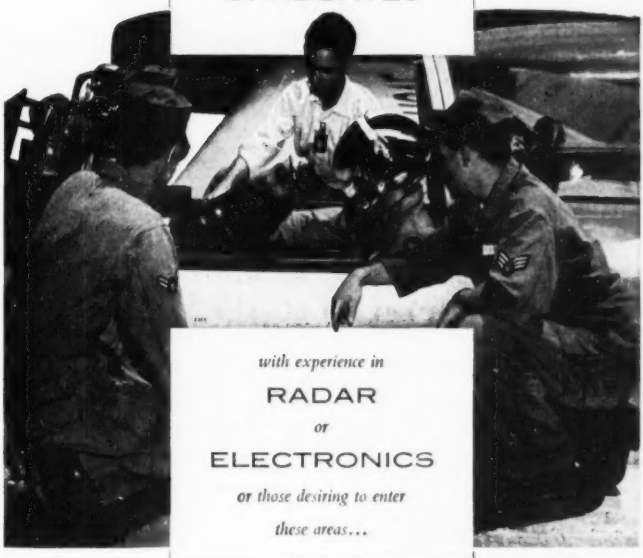
The transmitter should be modulated to produce a two-tone signal with a frequency separation of about 2000 cycles, and the amplitude of the third-order distortion can be compared with the amplitude of one of the tones simply by reading the difference on the S-meter as the receiver is tuned from one to another of the frequency components in the transmitter output. To avoid generating distortion in the front end of the receiver the r.f. gain control should be operated nearly wide open and the receiver input decoupled from the transmitter output to keep the maximum S-meter reading a little below full scale. Care must be taken to insure that the signal is getting into the receiver only through the antenna input terminals and not through the a.c. line, and also that the signal is coming from the output circuit of the stage being checked and is not a composite of stray radiation from several circuits and stages.

The accuracy of distortion measurements by this method depends on the care used in observing the precautions listed above and on the accuracy of the S-meter calibration. Even though the S-meter calibration is "off," the method is useful for adjustment purposes if the precautions are observed, since it will show qualitatively the effect of changes in operating conditions or tuning.

Strays

Amateurs visiting the London, England, area are invited to contact hospitable G3IDG. Hams should feel quite at home on the "tight little island." In Brentford, Middlesex, there is a culde-sac named *The Ham*. . . . In Richmond, Surrey, is a *Ham* Street. . . . In Soho, London, there is *Ham* Yard. . . . *Ham* is an urban district of Surrey. . . . London's *Ham*let Gardens and *Ham*let Road are particularly inviting to diminutive amateurs.

ELECTRICAL ENGINEERS *or* PHYSICS GRADUATES



with experience in

RADAR *or* ELECTRONICS

or those desiring to enter these areas...

The time was never more opportune than now for becoming associated with the field of advanced electronics. Because of military emphasis this is the most rapidly growing and promising sphere of endeavor for the young electrical engineer or physicist.

Since 1948 Hughes Research and Development Laboratories have been engaged in an expanding program for design, development and manufacture of highly complex radar fire control systems for fighter and interceptor aircraft. This requires Hughes technical advisors in the field to serve companies and military agencies employing the equipment.

As one of these field engineers *you will become familiar with the entire systems* involved, including the most advanced electronic computers. With this advantage you will be ideally situated to broaden your experience and learning more quickly for future application to advanced electronics activity.

Positions are available in the continental United States for married and single men under 35 years of age. Overseas assignments are open to single men only.

Hughes Field Engineer William H. Scott instructs Air Force personnel in connection with Hughes equipment.

Scientific and Engineering Staff

HUGHES

RESEARCH AND DEVELOPMENT LABORATORIES

Culver City, Los Angeles County, California

Assurance is required that relocation of the applicant will not cause disruption of an urgent military project.

25-Watt Modulator

(*Continued from page 23*)

$$Z_m = \frac{E_b}{I_p} \times 1000 \text{ ohms}$$

where E_b = d.c. plate voltage
I_p = d.c. plate current (ma.)

For example: The 6146 r.f. amplifier is to be operated at 450 volts with a plate current of 100 ma.

$$Z_m = \frac{450}{100} \times 1000 = 4500 \text{ ohms.}$$

Naturally, the chart furnished with the universal modulation transformer should be consulted for the connections that will permit a match between the 9000-ohm plate-to-plate load of the 6L6s and the anticipated r.f. load resistance.

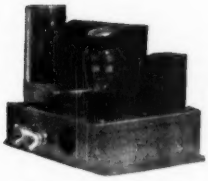
Methods of testing audio circuits are treated in detail in the modulator equipment chapter of the ARRL *Handbook*. However, a quick and easy test of this unit can be made by tapping either a speaker or a pair of headphones across a portion of a 25-watt load resistor. The resistor should be connected across Terminals 3 and 6 of J_1 and the tap should be adjusted to give reasonable output volume. Of course, it is both *dangerous* and *unnecessary* to apply d.c. voltage to the secondary of T_2 during this check.

After the loading details have been worked out, it is time to connect the appropriate microphone between Terminals 7 and 8 of J_1 and to apply power. Figs. 1 and 2 show the approximate potentials that may be expected throughout the circuit provided that all 3 tubes are behaving properly. Plate current for the 6L6s should idle at approximately 88 ma. and should rise to 100 ma. or so with the application of voice modulation. If a milliammeter has been inserted in the plate-voltage lead external to Terminal 4 of J_1, it will register the 6L6 screen-current swing of 5 to 17 ma. as well as the plate drain.

Full output from the 6L6s should be obtained when the crystal-microphone input circuit is adjusted, by means of R_5, for somewhat less than half gain. With the carbon-microphone input circuit employed, full power from the modulator should be obtained with gain control at the approximate midscale.

In an actual mobile installation, the modulator unit may be separated from the r.f. assembly by any convenient distance. The cable used to connect J_1 of the modulator with J_3 of the r.f. section should be made with individually-shielded leads (Belden No. 8885 is quite suitable). It is also advisable to add a 100-$\mu\mu$f. capacitor between Terminals 7 and 8 of J_3 of the transmitter. This by-pass capacitor for the microphone output line will reduce the possibility of feed-back when both the audio and the r.f. circuits are activated.

MOBILE POWER # PALCO **MOBILE POWER**

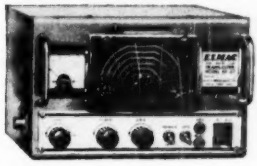


Model 606-6V Kit $29.50
Model 612-12V Kit $33.50

- ★ 500 V. DC 225 Ma.
- ★ No battery drain on standby
- ★ Instant start, stop — no waiting
- ★ Communications type Vibrator
- ★ Small and rugged. Ship. Wt. 14 lbs.
- ★ Size 6 x 7 x 6¾. Mtg. plate 6 x 9

- ★ Complete power supply
- ★ 6 Volt input
- ★ Output power selector Sw. Pos #1 500 V 225 Ma. Pos #2 400 V 170 Ma.
- ★ Built in relay for remote control
- ★ On-off sw for local control
- ★ 700 Volt filter condensers
- ★ Extra heavy duty Vibrator

Model 6A $49.50



Elmac AF-67 Mobile Transmitter with **Palco Model 6A Power Supply** **$226.50**

Elmac PMR-6A Receiver (less speaker) **134.50**

Elmac 6 or 12 V. Receiver Power Supply **24.50**

Fast Delivery • Personal Service • Complete Stocks

Cornell-Dubilier Dictator Model 6/12D5

Designed to operate dictating machines or other AC devices such as shavers, phono turntables or small amplifiers in automobiles or boats. Delivers 110 V. AC 60 cycle power up to 50 watts continuously, and handles loads up to 75 watts on a short-time basis. Operates from either 6 or 12 volt battery.

AC Power

Cornell-Dubilier D.C. to 110 V. AC Converters

TYPE	INPUT	WATTS OUTPUT	NET PRICE
6/12D5	6-V	50–75	**$26.53**
6R10	6-V	100–125	**40.25**
12R8	12-V	80–100	**28.37**
12RU15	12-V	150–175	**53.39**
32R8	32-V	80–100	**32.81**
110R10	110-V	100–125	**27.02**

Order From

PALCO ENGINEERING, INC. BOX 41 Carmel, Indiana

Impedance-Matching Transformer

(Continued from page 29)

15,000 (50 × 300), or 122.5 ohms. Then at 14.25 Mc. we find:

$$C_1 = C_2 = 0.0000915 \ \mu f. = 91.5 \ \mu\mu f.,$$

and $L_1 = L_2 = 1.37 \ \mu h.$

The photographs show a 50-ohm (unbalanced) to 300-ohm (balanced) transformer that was built for experimental use.

As noted before, the bridge is a single-frequency-pass device. The attenuation of the experimental transformer, which was resonant at 14.25 Mc., was approximately 0.05 db. per kc. off resonance, both above and below the resonant frequency. The attenuation of all harmonic frequencies up to the 25th (introduced at the same input-voltage-level as the fundamental) was at least 25 db. Over the Channel 2 to Channel 6 TV spectrum the harmonic attenuation was found to be between 38 and 50 db. This is the region of the 4th, 5th, and 6th harmonics from the 14-Mc. fundamental.

Unless the device is used at the operating position, one is restricted to a rather narrow band of operation. This band is of the order of plus or minus 20 kc. at 14 Mc. without retuning and with acceptable losses. If retuning is possible *using the condensers only*, it will operate efficiently over a fairly wide range. X_{C1} and X_{C2} can be mechanically coupled with an insulated coupler for single-dial tuning, since they will have the same capacity at any given frequency.

With a geared arrangement that will tune the condensers and slug-tuned coils (or variometers à la 1920) simultaneously, one should be able to build a single-dial control device to work over a wide band with low losses and excellent harmonic discrimination.

If R_2 is open, X_{C1} and X_{L1} (as well as X_{L2} and X_{C2}) will become series resonant at the design frequency. When R_2 is short-circuited, X_{C1} and X_{L2} is a parallel resonant circuit at the design frequency and is in series with another such circuit ($X_{L1}X_{C2}$). This means that R_1 is short-circuited when R_2 is open. With R_2 short-circuited, the bridge appears to be an open circuit to R_1. These terminal conditions are useful in tuning the bridge to a specific frequency.

Ratings of condensers and inductances will depend, naturally, upon the type of service, power, and modulation requirements.

With an acknowledgment of the limitations of the bridge, we nevertheless believe that it may be useful in many applications.

Strays

Among routine aspects of a communications assignment at the recent Milwaukee 1954 National Air Pageant, W9s ONY, WYH and VBZ ran into an odd one. Their mobile was called upon to race a plane to West Bend, Wis., reporting in at five-minute intervals. (The plane was declared the winner.)

Break-In

from page 31)

line must be opened and the arm of the 50,000-ohm key-down gain control run directly to the a.v.c. line (with no series resistance). The a.v.c. switch of the receiver must be left in the "on" position or else disconnected if it is a multifunction switch. An additional *R-C* time constant network should *not* be added to the a.v.c. line since this is built into the control unit. Fig. 2 shows the hook-up for this type of receiver gain clamp system, with the addition of a switch to cut it out and switch to normal a.v.c. operation.

Practical Hints

The construction and placement of the various components of this system may be left pretty much to the builder. At W9LLQ, the control unit is built as an integral part of the VFO, from whose power supply it derives its operating voltages. The antenna switch and gain clamp, together with a "Monitone" keying monitor, are built as a separate unit complete with power supply that sits atop the receiver.

To eliminate the problem of voltage adjustment and adjustment interaction, the negative 105 and 210 volts for the control unit are regulated by two series 0B2s.

It is highly recommended that no stage following the keyed amplifier in the transmitter have excessive fixed bias on it. "Excessive" in this case means more than about one and one-half times cut-off. The reason for this is that a stage with a large amount of fixed bias may introduce key-clicks on the signal. At the same time it is recommended that the final have a fixed bias slightly greater than cut-off, so that the transmitter will not act as a noise generator feeding the receiver.

Adjustment

The following procedure is followed to set up the three potentiometer adjustments:

1) Remove the 12AX7 control tube from its socket to turn the oscillator on continuously, then adjust the 1-megohm keyer bias potentiometer just past the point where the output of the keyed stage goes to zero.

2) Put the 12AX7 back in its socket and adjust the 10,000-ohm potentiometer in the control unit somewhat past the point where the oscillator turns off with the key open.

3) With the key closed, adjust the 50,000-ohm key-down gain potentiometer until the receiver is completely silenced (or until the gain is reduced to the desired level).

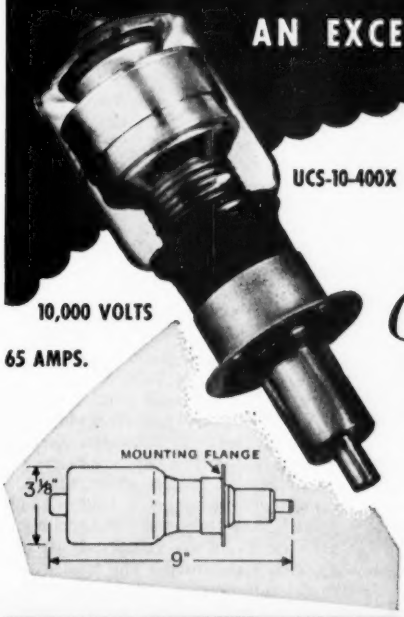
Strays

After writing W3IYE for a Delaware schedule, HB9KU showed up eagerly at the right time and on the right frequency. W3IYE bounced right back on the first call. What's so unusual? W3IYE had never received HB9KU's sked request!

AN EXCEPTIONAL BARGAIN

A BEAUTIFUL, BRAND-NEW
FULLY GUARANTEED, 10,000 VOLT

UCS-10-400X VACUUM VARIABLE CAPACITOR AT *half-price*



10,000 VOLTS

65 AMPS.

This is the first time that a capacitor of this type has been offered at other than full price. These capacitors are not war surplus items. A limited quantity was produced for a leading electronic manufacturer, every unit being required to meet exacting inspection tests. The capacitors were manufactured by Jennings Radio Manufacturing Corp., internationally recognized as the foremost producers of vacuum variables of highest quality.

Elmar Electronics was fortunate in obtaining this desirable merchandise as the result of contract cancellation and is making it available at an exceptionally low price. Every capacitor is fully guaranteed, each is new, in perfect condition.

How else can you hope to duplicate . . . or even approach . . . performance characteristics like these? An air variable with 10 to 400 mmf capacity ratio and 10 kv breakdown would probably exceed two feet in length. Both fixed and movable elements in this UCS capacitor are sealed in an evacuated glass envelope, motion within vacuum being achieved by a sealed-in flexible bellows actuated by an externally-driven lead screw. Elements can thus be close-spaced without danger of flashover . . . are unaffected by dust, moisture, elevation.

Here indeed is exceptional value.

UCS-10-400X *69.50*

SPECIFICATIONS

CAPACITY: 10 mmf min. 400 mmf max.
VOLTAGE RATING: 10,000 volts. . . .
CURRENT RATING: 45 amperes, RMS. .
DRIVE: Low backlash leadscrew, 25 turns for complete capacity range.

APPLICATIONS

(1)—FINAL TANK CAPACITOR:
for single-ended stages of all types. Particularly effective where HV is used on 100% AM stage. Mounting permits direct, low inductance, stator-to-chassis RF path . . . . . .

"C" adequate for any stage, linears included, on low frequency bands yet very low minimum permits operation on higher frequency bands with low "C". . . .

High capacity ratio, (40:1) opens up real possibilities for multi-band operation . . . . . .

Two UCS-10-400 may be ganged readily by gearing for balanced P-P operation.

(2)—PI NETWORKS:
Ideal as tunable input or output capacitors for pi networks particularly where high RF currents are involved. Eliminates expensive, switched micas. Maximum capacity adequate for most high powered tetrode stages working into 52 ohms, even at 80 meters. (See QST 1954, May P 13, Aug. P 30). . . . . .

CONDITIONS OF SALE.

Shipments express only, add 1.60 per unit. All COD orders must be accompanied by 20% deposit. California orders add 3% state sales tax. All merchandise guaranteed new, perfect. All merchandise subject to prior sale. All prices subject to change without notice.

Available only at. . . . . .

ELMAR ELECTRONICS
140 - 11th ST. OAKLAND 7, CALIF.

CD-10-TC

Continued from page 88)

and a 2.5-mh. choke are added at the cathode of the b.c. power supply rectifier, as indicated in Fig. 1. For a satisfactory operation on 10 meters, a noise limiter should be installed in the car receiver. Suitable limiter circuits are shown in the receiver chapter of the ARRL *Handbook*. To eliminate the necessity for two antennas, your present b.c. antenna should be replaced with a 96- to 100-inch antenna connected to the transmitter-converter with a piece of 52- or 72-ohm coax cable.

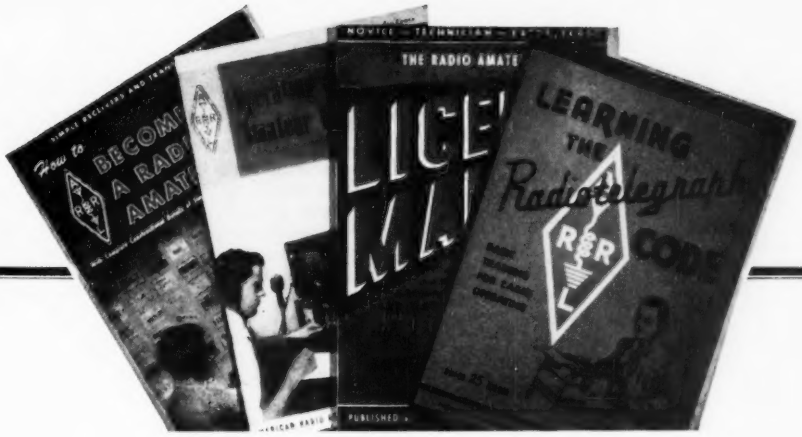
Adjustment

For the transmitter, standard tuning procedures apply. With an appropriate 7-Mc.-range crystal inserted (approximately 7126–7423 Mc.), adjust the oscillator plate-circuit trimmer, C_2, for maximum drive to the final grid. This may be measured across R_1 with a voltmeter, or a milliammeter may be inserted between R_1 and ground. In either case, a 2.5-mh. choke should be placed in series with the negative lead of the meter to prevent loading the circuit. The reading should be between 45 to 65 volts, indicating approximately 2 to 3 ma. drive. The final amplifier is brought into resonance with C_4, and the antenna loaded with C_5. (A ten-watt lamp makes a suitable dummy load for initial tuning.) The minimum plate current with no load will be approximately 15 ma. as measured across J_3 and J_4. When loaded into an antenna or dummy load, the plate current should be about 30 ma. with a plate voltage of 200 volts d.c. supplied from the receiver. A power input of 6 watts should be sufficient for local c.d. applications.

All coils of the converter section may be prealigned with a grid-dip meter if available. If the winding specifications are followed, no trouble should be experienced in adjusting the coils. To determine if the oscillator section of the converter is operating, apply voltages and tune for a signal around 28 Mc. on your home-station receiver. The trimmer, C_1, if used, should be adjusted for maximum S-meter reading, or at the point of most stable operation. In this particular model, coil L_4 was used, omitting C_1, and the oscillator took off with no trouble. After installation in the car, the grid and plate coils of the 6AK5 can be tuned for maximum signal on the local c.d. net-control station. The car receiver may be used in its normal fashion by switching S_1 to the b.c. position.

Strays

For the information of mobileers: Cadillac, Buick, Packard, Chrysler and Oldsmobile models are coming off the lines equipped with 12-volt ignition systems.



Gateway to Amateur Radio!

- ★ HOW TO BECOME A RADIO AMATEUR
- ★ THE RADIO AMATEUR'S LICENSE MANUAL
- ★ LEARNING THE RADIOTELEGRAPH CODE
- ★ OPERATING AN AMATEUR RADIO STATION

Anyone starting out in amateur radio will find these publications a necessary part of his reading and studying for the coveted amateur radio operator's ticket. Written in clear, concise language, they help point the way for the beginner. Tried and proven by thousands upon thousands of amateurs, these ARRL publications are truly the "Gateway to Amateur Radio."

$1.25

POSTPAID

The American Radio Relay League, Inc. — West Hartford, Connecticut

Fulminatin's

(Continued from page 34)

bulb never heard that phonetics are meant to clarify *only* when in doubt.)

The disheartening thing about it is that this same cousin to the Jukes family is so often casually indifferent to such trivia as message place of origin, or check, or for that matter whether his word count appears to agree. He skips blithely and glancingly over unusual names, letter or number sequences, etc. But by golly he's going to be double-plus certain you don't miss the word *number*. And if that didn't tear the rag off'n the bush, I actually heard one who "Cue Selled" a "Mike Sugar George"!

Now according to my source of information, the latter aberrations may have originated in military nets. Even the brass seem to have had their fill of the same. Heard tell of recent MARS directives recognizing that there are times when plain English (!) might possibly be intelligible when spoken into a microphone. Seems this contriteness is a bit late in preventing the infection from spreading throughout the ham bands. Just might be that this military gobbledegook could reach epidemic proportions unless nipped in the bud.

Well, mama says I gotta quit now, before the steam burns my ears. Mebbe we can sneak off into a corner agin some other time and take a good à la T.O.M. swipe at some of the other pests infesting the "King Charleys."

See, they've got me doing it . . . "Nan Uncle Tare Sugar."

73.

— FOGEY

How's DX?

(Continued from page 64)

up in Miami . . . . . Ex-MARS-AI4AO, now K6CCZ, would like to hear from some of the many MARS ops he QSOd from APO 74 where regular hamming is prohibited . . . . . WL7BDR informs that KL7HCE (ex-W2HCE) has headed Statesward for reassignment . . . . . HR1BG specializes in Down Under QSOs and probably is the most familiar Honduras signal heard in VK/ZL since HR1MB closed down his 28-Mc. powerhouse . . . . . W2EQS seeks a lead on ex-KL7KB; W9UKG likewise regarding QSLs from CR6CS, OX3s BD GG, OA1C and SU1SS, all worked over a year ago . . . . . A line to RCCR (Costa Rica) at P.O. Box 2412, San Jose, will net you complete details on that society's new T-TI DX award. It's based on QSOs with any seven of the eight TI call areas (TI2 through TI9) and now is available on a world-wide basis . . . . . Nowadays single-sideband fun by no means is restricted to the local round-table variety. Recent 2-way s.s.b. QSOs with DL4s AIR DU KR PU, G2IG, HB9s FU HF OJ, KA8 2LK 3MD 4MA, KH6KS, KT1s DD PU, KZ5GS, TI4JK, VK4CC, ZL8 2IA 3IA 4FO, ZS8 3BC 6KD and 4S7WA are listed by W4NQN. Bob is no neophyte among ham ranks although his fiery enthusiasm for the game belies the fact that he first fired up spark in 1911 . . . . . A new DX group with headquarters down Texas way is the "200" DX Club. Among its membership are W4s HA MKB, W5s BGP EFC KUC MPG, W6AM, W8s EWB GZ PQQ RLT and CM9AA . . . . . W1WPO clarifies some of this ZM7 business by stating that the Tokelau (Union) Islands include Atafu, Danger Islands, Fakaofo, Manihiki, Nukunon, Rakahanga and Tongareva (Penrhyn).

Sideband Filters

(Continued from page 40)

in a resistive balance at one of the attenuation peaks, assuring both reactive and resistive balance at this frequency.

If the attenuation peaks are chosen close to the passband edges, it will be found that the equivalent circuit inductance of one of the crystals will become very large, making the use of FT-241-A crystals appear impractical. In such an event, recourse may be had to one of the "tricks of the trade;" i.e., an impedance transformation.[8] By means of a series capacitance it is possible to raise the effective impedance of the crystal arm, thus enabling the FT-241-A crystal to be used in this configuration without excessive modification. The equivalent circuit and equations are shown in Fig. 9. The procedure to be followed in determining the crystal parameters, if this impedance transformation is used, is as follows:

$$\text{where } C_C = C_B \left\{ \frac{\frac{L_A}{L_C}}{\frac{C_B}{C_A} - \sqrt{\frac{L_A}{L_C} + 1}} \right\}$$

$$C_S = C_B \left\{ \frac{1}{1 - \sqrt{\frac{L_C}{L_A}}} \right\}$$

$$C_D = C_B \sqrt{\frac{L_A}{L_C}}$$

Fig. 9 — When the equivalent circuit inductance of one of the crystals in a half-lattice filter becomes too large, a series capacitance, C_S, is added.

First, calculate the filter parameters as indicated previously, determining the value of Z_0 by substituting the known value of crystal equivalent circuit inductance in the equation for the inductance of the crystal in the arm containing the lower equivalent circuit inductance. The equivalent circuit inductance of the other crystal is known, as are L_A, C_A, and C_B. These known values are then substituted in the formulas for C_D, C_S, and C_D. The series-resonant frequency of the crystal can then be calculated from the values of L_C and C_C.

This method is general and may be applied to any of the arms of the filters described in this article. Only one caution need be mentioned, however, and that is the selection of a suitable

(Continued on page 150)

series condenser. It should be a low-temperature-coefficient condenser having low dielectric losses. C_C can not be smaller than the combined crystal shunt capacitance and stray capacitance, as is obvious, and the crystal will have to be modified in the event that such a result is obtained from the equations.

The names of John Holmbeck, W9KZO, and Ernest Overbey, W9GCB, should perhaps be listed in the references also, since a number of the facts presented in this article were first brought to the author's attention during "ham sessions" at the James Knights Company.

Appendix I

Design equations for the filter of Fig. 5:

$$L_a = Z_0 \frac{(f_b - f_a)}{2\pi f f_b}$$

$$L_b = Z_0 \left(\frac{(1+B)}{2\pi f f_b (f_b - f_a)(f_b + f_a)^2 (AB - C)} \right) (f_a^2 + B f_b^2)^2$$

$$L_a = Z_0 \left(\frac{(1+B)}{2\pi f f_b (f_b - f_a)(f_b + f_a)^2 (AB - C)} \right) \frac{(A f_a^2 + C f_b^2)^2}{C}$$

$$C_a = \frac{1}{Z_0} \left(\frac{f_b^2}{2\pi f f_b (f_b - f_a)} \right) \left(\frac{A f_a^2 + C f_b^2}{f_a^2 + B f_b^2} \right) - C_A$$

$$C_T = \frac{1}{Z_0} \left(\frac{f_a^2}{2\pi f f_b (f_b - f_a)} \right) \left(\frac{f_a^2 + B f_b^2}{A f_a^2 + C f_b^2} \right) - C_a - C_B$$

$$C_b = \frac{1}{Z_0} \left(\frac{(f_b - f_a)(f_b + f_a)^2 (AB - C)}{2\pi f f_b (1+B)^2} \right) \frac{1}{(f_a^2 + B f_b^2)}$$

$$C_b = \frac{1}{Z_0} \left(\frac{(f_b - f_a)(f_b + f_a)^2 (AB - C)}{2\pi f f_b (1+B)^2} \right) \frac{C}{(A f_a^2 + C f_b^2)}$$

$$f_{1}f_{2} = \frac{f_a^2 f_b^2 (1+B)}{f_a^2 + B f_b^2}$$

$$f_{1}f_{2} = \frac{f_a^2 f_b^2 (1+B)}{A f_a^2 + C f_b^2}$$

$$A = 1 + m_1 + m_2$$
$$B = m_1 + m_2 + m_1 m_2$$
$$C = m_1 m_2$$

$$m_1 = \sqrt{\frac{1 - \left(\frac{f_{a1}^2}{f_b^2}\right)}{1 - \left(\frac{f_{a1}^2}{f_a^2}\right)}}$$

$$m_2 = \sqrt{\frac{1 - \left(\frac{f_{a2}^2}{f_b^2}\right)}{1 - \left(\frac{f_{a2}^2}{f_a^2}\right)}}$$

where f_a = the lower passband limit frequency in cycles per second,

f_b = the upper passband limit frequency in cycles per second,

f_{a1} = the lower attenuation peak frequency in cycles per second,

f_{a2} = the upper attenuation peak frequency in cycles per second,

L_a and L_b = the inductances of the equivalent circuits of Y_1 and Y_2, respectively, in henrys,

C_a and C_b = the capacitances of the equivalent circuits of Y_1 and Y_2, respectively, in farads,

(*Continued on page 152*)

NEW AMECO PRODUCTS

FOLDED DIPOLE ANTENNA KITS

for 10 to 80 meters . . . using LOW LOSS twin lead

SENSATIONALLY LOW PRICED from $3.50

AMECO folded Dipole Antennas are easy-to-build Kits. The fine quality low loss twin lead has proven reliable in all weather conditions. Each kit complete with flat-top twin lead cut to desired frequency band, 75 ft. of lead-in wire, folded dipole connector block.

OTHER FEATURES INCLUDE:

- **Can safely handle up to 300 watts**
- **High strength, high dielectric connector block insures perfect impedance match and lowest loss**
- **No soldering necessary; solderless terminals and hardware provided**
- **Twin line uses heavy copper conductors and pure polyethylene insulation**
- **Antennas can be used for receiving as well as transmitting**

Available at these LOW PRICES

Model No.	Meters	Price Net
FD-10	10	**$3.50**
FD-20	15-20	**3.95**
FD-40	40	**4.95**
FD-80	80	**6.75**

STAY ON THE AIR!

BEAT TVI! The AMECO low cost way!

AMECO LOW PASS FILTER

Model LN-1

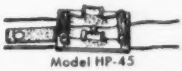
. . . suppresses radiation of all frequencies above 40 Mc, thereby removing a major cause of TVI. The Ameco low pass filter uses a constant K circuit, and is designed for coaxial cable (52 to 72 ohms).

OTHER FEATURES INCLUDE:

- **Negligible insertion loss**
- **35 db and more attenuation of harmonic and spurious frequencies above 50 Mc.**
- **Will handle up to 200 watts of RF power**
- **Each unit complete with bracket, connectors and instructions**

At the Amazing Low, Low Price of $1.95 Amateur Net

HIGH PASS FILTER



Model HP-45

The AMECO high pass filter is placed in series with the TV receiver's antenna to prevent the transmitter's signal from entering the receiver. All frequencies above 45 Mc are passed through without loss. The AMECO high pass filter is designed for use with the common 300 ohm twin line.

OTHER FEATURES INCLUDE:

- **40 db and more attenuation at 14 Mc. and below; 20 db attenuation at 10 meters.**
- **Negligible insertion loss**
- **Filter uses balanced constant K circuit**

At the amazing low, low price of 89¢ Amateur Net

Available at leading Ham Distributors, or write to:

AMERICAN ELECTRONICS CO.

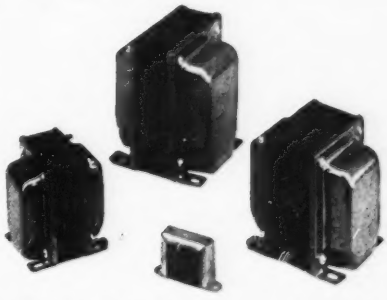
1203 Bryant Avenue • New York 59, N. Y.

New FREED COMPONENTS *for* HI-FIDELITY AMPLIFIER PROVIDE IMPROVED PERFORMANCE

This Freed circuit incorporated several changes from the original Williamson circuit to provide optimum performance at high and low frequency extremes. It is rated at 10 watts with triode connected output tubes. However, by connecting the screen grids of these tubes to taps provided on the Freed KA-10 output transformer, it is possible to double the power output for a given distortion percentage.

Recommended power supply is choke-input type with a two-section L-C filter to maintain constant D.C. output and to improve filtering to the voltage amplifiers.

The required 550 volts AC for the rectifier can be furnished by a Freed KP-10 power transformer.



FREED KP-10 POWER TRANSFORMER
FREED KA-10 OUTPUT TRANSFORMER
FREED KC-10 FILTER REACTOR
FREED KC-11 FILTER REACTOR

A DETAILED TECHNICAL SHEET AND PARTS LIST IS AVAILABLE ON REQUEST
ASK FOR BULLETIN NO. 5402

FREED TRANSFORMER CO., INC. 1703 Weirfield St., Brooklyn (Ridgewood) 27, N. Y.

C_A and C_B = the electrode-to-electrode capacitances of crystals Y_1 and Y_2, respectively, in farads,
L_0 and C_0 = the inductances and capacitances of the input and output coils and condensers in henrys and farads, respectively,
Z_0 = the midband image impedance of the filter in ohms, and
$f_{L_0C_0}$ and $f_{L_0C_0}$ = the series-resonant frequencies of Y_1 and Y_2, respectively, in cycles per second

For the FT-241-A crystals, L_0 and L_0 run about 10 henrys. Typical *approximate* values calculated from the formulae are listed below, to offer a general idea of the order of magnitude of the parameters involved to the designer:

f_a = 453.0 kc.
f_b = 457.0 kc.
f_{a_1} = 452.5 kc.
f_{a_2} = 457.5 kc.
m_1 = 2.98
m_2 = 0.33
L_0 = 10 henrys
L_0 = 10 henrys
C_A = 0.0119 μμf.
C_B = 0.0119 μμf.
L_0 = 0.350 x 10^{-3} henrys
C_0 = 340 μμf.
Z_0 = 0.118 megohm

Appendix II

Design Equations for Series-Coil Lattice Prototype Filter of Fig. 8

$$L_0 = Z_0\left(\frac{f_b^2\,(Af_a^2 + Cf_b^2)}{2\pi f_a f_b\,(f_b - f_a)\,(f_a^2 + Bf_b^2)}\right)$$

$$L_1 = Z_0\left(\frac{f_a^2\,(f_a^2 + Bf_b^2)}{2\pi f_a f_b\,(f_b - f_a)\,(Af_a^2 + Cf_b^2)}\right)$$

$$L_2 = Z_0\left(\frac{\{f_b^2\,[B\,(A + C) - C] + 2Cf_a^2f_b^2 + Af_a^4\}^2}{2\pi f_a f_b\,(f_b - f_a)^2\,(f_b + f_a)^2\,(f_a^2 + Bf_b^2)\,(AB - C)}\right)$$

$$L_3 = Z_0\left(\frac{\{BCf_b^4 + 2Cf_a^2f_b^2 + f_a^4\,[A\,(1 + B) - C]\}^2}{2\pi f_a f_b\,(f_b - f_a)^2\,(f_b + f_a)^2\,(Af_a^2 + Cf_b^2)\,(AB - C)\,C}\right)$$

$$C_0 = \frac{1}{Z_0}\left(\frac{(f_b - f_a)\,(f_a^2 + Bf_b^2)^2}{2\pi f_a f_b\,\{f_b^4\,[B(A + C) - C] + 2Cf_a^2f_b^2 + Af_a^4\}}\right)$$

$$C_1 = \frac{1}{Z_0}\left(\frac{(f_b - f_a)\,(Af_a^2 + Cf_b^2)^2}{2\pi f_a f_b\,\{BCf_b^4 + 2Cf_a^2f_b^2 + f_a^4\,[A\,(1 + B) - C]\}}\right)$$

$$C_2 = \frac{1}{Z_0}\left(\frac{(AB - C)\,(f_b - f_a)^2\,(f_b + f_a)^2}{2\pi f_a f_b\,\{f_b^4\,[B(A + C) - C] + 2Cf_a^2f_b^2 + Af_a^4\}\,(A + C)}\right)$$

$$C_3 = \frac{1}{Z_0}\left(\frac{(AB - C)\,(f_b - f_a)^2\,(f_b + f_a)^2\,C}{2\pi f_a f_b\,\{BCf_b^4 + 2Cf_a^2f_b^2 + f_a^4\,[A\,(1 + B) - C]\}\,(1 + B)}\right)$$

$C_A + C_{a_1} = C_1$
$C_B + C_{b_2} = C_0$
where $A = m_1 + m_2 + m_3$
$B = m_1m_2 + m_1m_3 + m_2m_3$
$C = m_1m_2m_3$

$$m_i = \sqrt{\frac{1 - \left(\frac{f_{a_i}}{f_b}\right)^2}{1 - \left(\frac{f_{a_i}}{f_a}\right)^2}} \quad \text{where } i = 1, 2, 3$$

C_{b_2} = crystal shunt plus stray electrode-to-electrode capacity,
f_a = lower cut-off frequency,
f_b = upper cut-off frequency, and
f_{a_i} = frequency of peak attenuation

Other symbols refer to Fig. 8.

Typical *approximate* parameter values for series-coil lattice prototype in terms of Z_0: (Fig. 8A)

f_a = 453.5 kc.
f_b = 456.5 kc.
f_{a_1} = 452.0 kc.
f_{a_2} = 458.0 kc.
f_{a_3} = 463.0 kc.
$L_0 = Z_0$ x 5.38 x 10^{-4} henry
$L_1 = Z_0$ x 5.23 x 10^{-3} henry
$L_2 = Z_0$ x 2.8 henry
$L_0 = Z_0$ x 2.7 henry
$C_0 = (1/Z_0)$ x 2.3 x 10^{-4} farad
$C_1 = (1/Z_0)$ x 2.3 x 10^{-4} farad
$C_2 = (1/Z_0)$ x 5.4 x 10^{-14} farad
$C_3 = (1/Z_0)$ x 4.5 x 10^{-14} farad
m_1 = 1.720
m_2 = 0.574
m_3 = 0.823

THIS is the Month!...

Check your gear for fast action in the 21st ARRL Sweepstakes — week ends of November 13th–14th and 20th–21st. Full details on pp. 48–49. *See you in the SS!*

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns.

(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature, and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League take the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 30¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested signature and address be printed plainly. Typewritten copy preferred.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QUARTZ — Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 248 Madison Ave., New York City 16.

MOTOROLA used communication equipment bought and sold. W5BCO, Ralph Hicks, 204 E. Fairview, Tulsa, Okla.

SUBSCRIPTIONS. Radio publications. Latest Call Books, $3.50. Mrs. Earl Mead, Huntley, Montana.

WANTED: Cash or trade, fixed frequently receivers 28/42 Mc. W9VIV, Troy, Ill.

WANTED: All types of aircraft radios, receivers and transmitters. Absolutely top prices. Dames, W2KUW, 308 Hickory St., Arlington, N. J.

WANTED: Early wireless gear, books, magazines and catalogs before 1925. W6GH, 1010 Monte Drive, Santa Barbara, Calif.

CODE slow? Try new method. Free particulars. Donald H. Rogers, Ivyland, Penna.

POSTCARD brings you free information on our new Amateur Desk Signs and money-saving club purchase plan. Hawkins Distributing Co., Paquatuck Terr., East Moriches, N. Y.

URGENTLY need AN/APR-4 items. New high prices. Littell, Far Hills Branch, Box 26, Dayton 9, Ohio.

RK-4D32, brand new, $17.50 postpaid. W5AXI.

HOTTEST Ham List in the nation! Trade-ins and closeouts of all leading Amateur brands including Collins, National, Johnson, Hallicrafters, Gonset, Elmac, Morrow, Harvey-Wells, RME, Millen, Meissner, Sonar. We trade and offer our own time payments tailor-made for you. All leading brands of new equipment in stock. Write for latest bulletin. Stan Burghardt, WØBJV, Burghardt Radio Supply, Inc., Box 41, Watertown, South Dakota.

NEED ARC-1! Bill O'Connell, 4908 Hampden Lane, Bethesda, Maryland.

WANTED: BC-348 receiver. W. Richards, 4908 Hampden Lane, Bethesda, Md.

NEED: ART-13. R. Ritter, 4908 Hampden Lane, Bethesda, Maryland.

WANTED: ART-13 transmitters. Write James S. Spivey, Inc., 4908 Hampden Lane, Washington 14, D. C.

TRANSFORMERS while they last! 550VCT @ 90 mile with 6.3VCT @ 3½ A, cased $2.00 each; 700 VCT @ 90 mile with 6.3VCT @ 3½ A cased, $2.20 each; 5260VCT @ ½ amp. ICS, $40.00 each. Grand Transformers, Inc., 226 Washington St., Grand Haven, Michigan.

WANTED: March, May, June 1916 *QST*. Sell four or more *QSTs* 1930 to date, 25¢ each. WØMCX, 1022 N. Rockhill Rd., Rock Hill 19, Mo.

SSB FT-241-A guaranteed crystals. Individually precision measured then marked true exact frequency. $1.00 each, postpaid. Selected set of 8 especially for lattice filter per 8/51 *QST*, $8.00. Orco Products, Box 51, Downey, Calif.

TELESCOPIC Aluminum tubing: All sizes: ⅜" x .058 wall, 12¢ per ft., ½" x .058 wall, 14½¢ per ft; ⅝" x .058 wall, 22¢ per ft. All sizes stocked. Handy Tool, Inc., P.O. 142, Tilton, N. H.

WANTED: Cash paid for BC-610 xmttrs and BC-221 frequency meters. In addition we buy technical manuals. Also TCS sets, RSAØ ARN-7, ART-13, DY-17, others. Amber Company, 393 Greenwich St., New York 13, N. Y.

DON'T Fail! Check yourself with a time-tested Surecheck Test. Novice, $1.50; General, $1.75; Amateur Extra, $2. Amateur Radio Supply, 1013 Seventh Avenue, Worthington, Minn.

MICHIGAN HAMS! Amateur supplies, standard brands. Store hours 0800 to 1800 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 605 Church St., Ann Arbor, Michigan. Tel. No. 8-8696, No. 8-8262.

QSLS? State-maps? Rainbow-map? Cartoon? Photo? Largest variety QSL samples, 25¢ (refunded). Subscriptions, renewals accepted to all radio magazines. Sakkers, W8DED, P.O. Box 218, Holland, Michigan.

QSL's, SWL's. Fair prices for excellent quality cards. Eleven styles for you to choose from. Samples, 10¢. Almar Printing Service, 423 Barker Bldg., Omaha, Nebraska.

QSL's-SWL's Meade WØKXL, 1507 Central Avenue, Kansas City, Kans.

QSLS-SWLS. 100, $2.85 and up. Samples 10¢. Griffeth, W3FSW, 1042 Pine Heights Ave., Baltimore, Md.

QSLS of distinction. Three colors and up. Uncle Fred, Box 86, Lynn, Penna.

DELUXE QSLS. Petty, W2HAZ, Box 27, Trenton, N. J. Samples, 10¢.

QSL-SWLS, Samples, free. Bartinoski, Houlton, Me.

QSLS. Samples free. Albertson, W4HUD, Box 322, High Point, N. C.

QSLS! Two colors, $2.00 hundred. Samples for stamp. Rosedale Press, Box 164, Asher Station, Little Rock, Ark.

QSLS "Brownie," W3CJI, 3110 Lehigh, Allentown, Penna. Samples 10¢, with catalogue, 25¢.

QSLS! Taprint, Union, Mississippi.

QSLS. Samples, 10¢. C. Fritz, 1213 Briargate, Joliet, Illinois.

QSLS: Beautiful blue, silver and gold on white glossy stock: $3.85 per 100. Two-day delivery. Satisfaction guaranteed. Rush order and get surprise of your life. The Constantine Press, Bladensburg, Md.

QSLS: Kromekote. W1KMP/6, Dauphinee, Box 78374, Los Angeles 16, Calif.

QSL-SWL cards, Sensational offer, Bristol stock 500 1 color $3.95, 2 color $4.95, 3 color $5.95. Super gloss $1.25 extra. Rainbow cards. Samples. QSL Press, Box 71, Passaic, N. J.

QSL samples. Dime, refunded. Roy Gale, W1BD, Waterford, Conn.

QSLS the way you want them. Samples 10¢. Vern's Print, 729 Juul, Hutchinson, Minnesota.

QSLS. Postcard brings samples. Fred Leyden, WINZJ, 454 Proctor Ave., Revere 51, Mass.

QSLS Personalized. 150, $2.00. Samples, 10¢. Bob Garra, Lehighton, Penna.

QSLS-SWLS, as low as $1.50 per color. Samples dime. Stromberg, P.O. Box 151, Highland Station, Springfield, Mass.

QSLS of quality. Reasonably priced. Samples 10¢. W3QCC, Ted Besesparis, Besesparis Printing, 207 So. Balliet St., Frackville, Penna.

QSLS-SWLS. Free samples. The Backus Press, C. Backus, 5318 Walker Ave., Richmond, Va.

QSLS, samples dime. Printer, Corwith, Iowa.

WESTERN Hams, order your QSLS in the west. Save time, save money. Personal Prints. P.O. Box 64553, Los Angeles 64, Calif.

QSLS. Postcard brings samples. Fred Leyden, WINZJ, 454 Proctor Ave., Revere 51, Mass.

QSLS! Ham Xmas cards! Samples all 10¢. Tooker Press, Lakehurst, New Jersey.

QSLS-SWLS. High quality. Reasonable prices. Samples 10¢ refunded. Joe Harms, W2JME, 225 Maple Ave., North Plainfield, N. J.

CHOKES: Kit of 10 assorted, 1.00 postpaid, 30/50; 144/152; 220/235 Mc., current production, not surplus. Manufacturers write for electrical specs and quantity prices. Lakeland Electronics, Dept. 100, Warsaw, Ind.

BC-348Q for sale. This is a beautiful receiver, in beautiful condx, with AC power supply and speaker. $65.00. Alen Gordon, W3RCD, 4623 N. Broad St., Phila. 40, Penna.

TIE-CLASPS. Your call letters handpainted in black on white, gold-edged, $2.25. Ceramics by Gee, 270 Fairforest Road, Spartanburg, S. C.

MILLEN 500 watt final #90881, complete with coils, tubes, filtran and manual, excellent, $45.00; also Millen exciter #90800 with tubes, coils and manual, $18.00; UTC S-22 250 watt universal Class B modulation xformer with chart, $12.00. M. Krauthoff, 2750 North 61st, Milwaukee, Wis.

SELL: BC-459A converted 20 and 40 with tubes, $12.50; BC-456 Modulator, new, $4.00, both $15.00. Partially wired 50-watt VFO-transmitter 10-20-40. Write for particulars. WØRFL, 345 W. 9th St., Fremont, Nebr.

WANTED: 400 to 1,000 watt 110 volt ac generator without motor; preferably used. David Drescher, WN1ZIH, Maple Rd., Portland, Conn.

COLLINS 70E 8-A osc. and National MB-150 all band tank built into bandswitching xmtr. 6146 final, class AB 807 mod., $125.00. M. Katz, 147-11 76th Ave., Flushing 67, N. Y.

VIKING II Spotless-two months old. Co-ax relay, D104 Mike. (I have no TVI problem) $285 prepaid UsA in original carton. $125 cash will handle if credit is gud. RCA Police transmitter with accessories and handset. Excellent cdx. Best offer. W7UPP, 9111 S. E. Insley, Portland 66, Oregon.

SELL: SX-28A, excel. condx., $125. S-38, $25.00. Turner 22-D mike & stand, $12. L. Burzycki, W1PGD, Box 307, Ossining, N. Y.

FOR Sale: One killowatt transmitter fully shielded and surpressed mounted in six foot Par-metal de luxe rack. Transmitter is a pair of 813s P.P. modulated by a pair of 805s 813 is driven by a Lysco Transmaster which has its own modulator and can be used separately. An extra final consisting of a single 4C24 G for lower power is included. $700.00 takes it. F.o.b. my home. Also have an extra V.F.O. transmitter a VX 101 X De Luxe. Make offer. Sidney Fritsch, W2NFU, 2 Center Dr., Flower Hills, Roslyn, L. I., N. Y.

SELL: Best offer takes excellent condx. Gonset Super-Six and/or '48 Kaiser (GE) radio. Best offer takes in-service Leece-Neville 7 volt 80 amp. L-N serviced alternator with year old rectifier, regulator. Also heavy duty 440-330-220-110 to 110 isolation xformer, BD77 with 6 volt relay control; WE 12 volt dynamotor with 625 out. W9OFU, 138 Chandler Blvd., Macomb, Illinois.

SACRIFICE: 1 RCA 802 3 600 watt complete transmitter; similar to Federal FT-102; frequency 2-24 Mc; modulator deck from BC-610 with 600 watt transformer; 2-811's, 3-1624's, 1-100th spare tubes. Price $175 F.o.b. Pictures on request. W5IGQ, Homer, Louisiana.

TUBES and meters: 2 new type 4E27 with ventilated base, 1 older type 4E27, 1 for $12, 2 for $20, all 3 for $25. Weston model 425, 4 amps RF, $8. Model 476, 15 volts AC, metal case, $3. Model 476, 50 ma AC, $2, metal case. Model 425, 120 ma RF, $5. McMurdo Silver absorption wavemeter with 4 coils, $3. R. W. Emott, W2AI, E. Madison Ave., Florham Park, N. J.

SELLING out: Viking I with spare 4D32 like new, $150.00. HQ129X with spker same condition, $125.00; 60 watt all band mobile rig with coils and 600 V dynamotor, $50.00; Gonset 3/30 converter, $20.00. W8MVZ, 12908 Lorain, Cleveland, Ohio.

SX-71, never used, $195; SX-28 good condition, minus cabinet, extra dial gearbox, $75 or best offer; Surplus unit; speech amp, pp 811 mod, 1v power supply & 1500 volt power supply on one chassis, plus pp 811/813 Thordarson mod xfrmr, $40 or best offer. Local sale only. W6BSX 869 9th, Manhattan Beach, Calif.

FOR Sale: New PE75 2.5 K.W, 110 volt A.C. 60 C.P.S. Take good late 5 to 7.5 H.P. outboard in trade or sell $295. Deliver 50 miles Louisville. U.H.F. signal generator 8 to 380 mc. Federal 804. Wanted: Reel arms and lenses for Bell and Howell Model M2 Design 138 Projector. W4KQU, Rt. 1, Box 246A, Coral Ridge, Ky.

FOR Sale or Trade: two 4/250 A's; three 4/125 A's; several dynamotors 6VDC input 420 V at 280 ma output, $15 each, or will swap. Write W9IGH, Arnold Hatfield, 202 E. Lowell Ave., Mishawaka, Indiana.

COLLECTING War Dept. Technical Manuals, etc. in communications and electronics. What have you got? Write to: Bob Briody, 140 West 57th St. (1 RE), New York 19, N. Y.

FOR Sale: BC-453 unmodified, $12, Navy version BC-453 converted with power supply, $15; four VT-127A, $1.50 each; ART-13 modulation transformer, $5; two Jennings 50mmf 20kv vacuum capacitors, $7.50 each. J. B. Bond, W4PHR/8, 2180 21st St., Nitro, W. Va.

FOR Sale: New pair of Eimac 4-125A's, $30. Complete station: Heath transmitter, VFO, antenna coupler, Lyaco 401 modulator, Hallicrafters S-38C; $100. Write to K2ENN, 198 Anstice St., Oyster Bay, N. Y.

NATIONAL 1-10 and power supply. Excellent. Bates, North Harwich, Mass.

MOBILES! Compact Volt-Ohm-Millimeters. Ranges: Volts AC and DC: 0-15-150-750. Mills: 0-150. Ohms: 0-100,000. Rugged bakelite case. Accurate. Test leads included. $11.95. Write for data sheet and photo. United Instrument Company, P.O. Box 242, San Francisco, California.

WANTED: NC-183 or NC-183D or equal. Good condition. Priced right. Dave Lifton, 140 B. 135 St., Rockaway Beach, N. Y.

FOR Sale: W3BO transmitter and receiver; Hallicrafter HT-9 with 10, 20 and 75 meter coils; few crystals and mike. Top operating order, excellent appearance. Price $140.00. Receiver National NC-125, six months old, like new. Works wonderfully well. Price, $100.00. At these prices no shipping. Paul Watson, 27 Price Street, West Chester, Penna.

"REALIST" 3-D Camera — will trade towards Viking transmitter or high fidelity equipment. Sakkers, W8DED, Holland, Mich.

SELL: ABK-4 receiver, 175-185 Mcs, 10 tubes; dynamotor, $10.00; BC-654 receiver, 3.8-5.8 Mcs, $5.00; 1100VDC 300 Ma power supply, heavy duty, $20.00; transformers, 4500V/.020A, $3.00, 450V/.2A, $5.00. Link RU-ADC police receiver, 40Mc/FM, $10.00; Mallory 2A rectifier, 24V/10A, $8.00. W1KJO, 29 Pine St., Bedford, Mass.

SELLOUT: BC-348K, BC-348J, DC with base, plugs, $65.00 each. 2 BC-522 transmitter receivers with tubes, $35.00 each. TS-69 frequency meter, 900-2100 Mc, perfect, $75.00. Edison Nickel 30 Cell, 450 ampere storage battery, 2 cells damaged, with Delco generator, $245.00. 4 Bendix Radio Compass beam indicator meters with selsyn generators, $7.50 pair. R78A/AS15A Radar Scope 46 tubes, $45.00. 60 GE Pyranol 1000 VDC 330 VAC rectangular filter condensers 3 mfd., 6 for $4.00. 6 BC-941 Coax antenna switches DPDT, $1.50 each. RCA-1502 10 meter police mobile transmitter, power supply "B" Modulator, dash controlls, mike, $45.00. Draft or money order. Roy Swale, W5DY, Clinton, Okla.

WANT: Gov't surplus or amateur equipment. Cash or trade for new Johnson, Viking, Ranger, Barker & Williamson, Hallicrafters, Hammarlund, National, Elmac, Gonset, Telrex, Central Electronics, Harvey-Wells, etc. Need ART-13, DY-17, CU-25, ARN-7, ARC-1, RTA-1B, BC-610, BC-614, BC-939, BC-348, BC-312, BC-342, TCS, teletype, tech. manuals, test equipment, BC-221, APR-4, ARC-3, power supplies. List of used transmitters, receivers, on request. Alltronics, Box 19, Boston 1, Mass. Richmond 2-0048.

FOR Sale: BC457A, BC459A and BC696A converted for 110 AC operation on 20, 40 and 80 meters respectively. Ray Perry, WØSJT, Rt. 3, Grand Junction, Colo.

SELL—RME-45 receiver, $85.00. Deliver central New York. H. Jankowski, 210 Fair St., Ithaca, N. Y.

RECEIVERS repaired and aligned by competent engineers, using factory standard instruments. Prompt service, at low cost. Our nineteenth year. Douglas Instrument Laboratory, 176 Norfolk Avenue, Boston 19, Mass.

BC-342-J with FL-8 filter for sale, $65 f.o.b. Wm. H. Kindler, W3STV, 328 Clugston Ave., Turtle Creek, Pa.

SELLING out: 200 watt xmtr 6L6-807-TZ40 with 3" meter rotary switched to 5 ckts; fully controlled from front panel incl. neutr. and variable link; complete with tubes, meter, all coils $80.00 (2 sets 10 and 15 mc). BVL; rack mounting 19" x 9" panel; heat parts used, $60. Power deck for above: 1 separate power supplies 400, 750, 1000-1500 v.d.c. full wave rect., hvy filters; rack mounting 19" x 10½"; top quality parts, $45. Both units, $100. New B & W CX82B, N.I. neutr. plates, jack bar, mtg bkts, HDVL swinging link and all HDVL 80-10 KW coils for $35 (net cost $76.55). Pair $22. First check buys, all other checks returned. Shpg chgs collect. S. Tucker, W2HLT, 51-10 Little Neck Pkwy., Little Neck 62, N. Y.

VIBRAPACK 6 v #557 Mallory 400 at 150 mils, plus output filter on sub-chassis. Tested but unused. ½ amateur net cost f.o.b. Maplewood. Write, F. B. Parsons, 12 Washington Park, Maplewood, N. J.

FOR Sale: Heath TV Sweep Generator, Model TS-2, excellent condition, $25.00. No trades. W2DJQ, 12 West 87th St., New York 24, N. Y.

WANTED: 3000V filter capacitors, two foot rack cabinet. Will buy (ugh!) or swap. Also parts for sale or swap. Stamp for list. W4PMM/5, 2237 West Alabama, Houston, Texas.

BARGAINS with new guarantee: R-9-er, $15.00; Gonset Triband, $27.50; VHF-152A, $39.50; S-72, $59.50; S-40, $65.00; NC-57, $65.00; RME-45, $99.00; Lyaco 600, $89.00; S-27, $99.00; SX-43, $129.00; S-76, $149.00; SX-71, $169.00; SX-42, $189.00; HRO-50, $275.00; HT-17, $32.50; EX Shifter, $49.00; Globe Trotter, $49.50; Harvey Wells, Sr., $69.00; DeLuxe, $89.00; Viking I, $209.50; New SS-75, $189.00; HT-9, $159.00; Globe King, $295.00; 32V1, $395.00; 32V2, $475.00; 32V3, $595.00. We need used receivers. We give highest allowances for S-20R; SX-71; NC-100; S-40B; NC-125; SX-24; SX-25; HQ-129X; and similar receivers. Free trial. Terms financed by Leo, WØGFQ. Write for catalog and best deals to World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

FOR Sale: Measurements Corp. Model 80 standard signal generator, 2 megacycles to 400 megacycles, first class condition, $275.00. W2BDS, Asbury Park, N. J.

BEEN collecting this stuff for years, now it's gotta go. Meters, transformers, tubes, selsyns, dynamotors, condensers, switches, receivers. The biggest list you ever saw for a three cent stamp. W9ERU, 2511 Burrmont Road, Rockford, Illinois.

WANTED: Copy of "Amateur Radio Stations of the United States," edition of June 30, 1927. Give price and condition. W. Bridgham, 82 Noblehurst Ave., Pittsfield, Mass.

SWAP, late model Rollecord, case, flash, filters for communication receiver of equal value. W4BIR, 3611 Wimberly Lane, Chattanooga, Tennessee.

SELLING Collins 75A-2, 148C-1 NBFM adapter, 8R-1 calibrator, speaker. Excellent condition. First $325.00. Also Gonset Tri-Band $25.00. WØMWD.

APT-5 unmodified, all tubes. 300 to 1600 Mc. 60 Watts output. Make offer or trade for teletype equipment. Don Twining, 113 So. Elmwood, Aurora, Illinois.

REAL bargains: New and reconditioned Collins, National, Hallicrafters, Johnson, Elmac, Gonset, Babcock, Morrow, RME, Millen, Lyaco, others. Reconditioned S-38, $29.00; S-40A, $69.00; S-76, $129.00; NC-57, $69.00; NC-88, $89.00; NC-125, $129.00; NC-183, $199.00; HRO-50T1, $329.00; HRO-60, $399.00; HQ-129X, $169.00; VHF-152A, $39.00; RME-45, $99.00, Gonset Tri-band, $29.00; Super-Ceiver, $79.00; S-40B, SX-71, SX-28A, SX-42, SX-62, HFS, HRO-5, HRO-7, Collins 75A-1, 75A-2, 32V-2, 32V-3, Viking II, Harvey-Wells Bandmaster transmitter, other equipment on trial. Easy terms. Satisfaction guaranteed. List free. Henry Radio, Butler, Missouri.

S-40A, perfect, $55.00; Q-5'er, $15.00; also: Solar Enlarger w/3.5 lens plus all kinds of photo equipment. Sell or trade. Geo. Paules, 231 Sherman Av., NYC 34.

FOR Sale: Simpson 303 VTVM, $50. Electro-Voice 726 Microphone, $30, both new, in original cartons. Astatic WR-20 microphone, $10. Modulation transformer, 150 watts, for 807's, $5. Thordarson matching chokes, 600 ma., $10 each. Astatic 505-B microphone, high impedance, $10. Westinghouse RF ammeter, 0-2½ amps., $5. Simpson meter, 0-100 ma., $2. Microphone, T-17, $5. James W. Craig, Jr., 3413 W. Roosevelt Drive, Lake Charles, Louisiana.

BRAND new Precise development Model 300 7" wide band oscilloscope. Perfect condition. Cost $200. First $75.00 takes it. W5LFB, 1614 Morson Road, Jackson 9, Miss.

VIKING II and VFO factory wired — new appearance — A-1 condition, $325.00. Fred Norton, 1450 Winchester Drive, Muskegon, Mich.

FOR Sale: Babcock Mobile power supply, $40; Browning frequency monitor, type M1-170, $25; 60 Amp. Ford generator with regulator, $25; one 100th, $10; three VT127A, $2.25 each; two 813, $5 each; seven each 1625 and 1626 @ 50¢; two 5514, $4 each; new Motorola UHF converter, $15; Sams Photofact, Volumes 1 through 18, complete and like new, $300; Heathkit Grid Dip Meter, Model GD-1B, $20. Calvin J. Evans, W9LTR, LaGrange, Indiana.

500 watt com'l-looking 80 thru 10 phone transmitter with 300 watt UTC modulator separate power supplies, all cabinet enclosed. Recently built, new parts. $295 f.o.b. WØQFZ, 2318 Second Ave., Council Bluffs, Iowa.

SELL or swap: Collins VFO, Jennings Variable Vacuum, many other parts. Send for list. Want Millen 90810, Panadapter, SX25, what have you? Al Corbin, W5KXD/2, Route 1, School Street, Hanover, New Jersey.

JOHNSON Viking II complete with Johnson VFO and mike, wired and in fine working condition, $300.00; BC348L receiver converted with speaker, $75.00; 10 meter beam and tower, $25.00; SCR-522 two meter transmitter and receiver, $35.00. M. D. Welch, 2640 50th St., S. W., Seattle 6, Wash.

FOR Sale: QST 52 & 53. Used coils 25-500W B & W, Bud, Johnson, half off. Bellavit, W3TVA, Slickville, Pa.

FOR Sale: Transmitter Viking one and ECO; RME 50 receiver; Bell speech amplifier model 5715; BW600 grid dipper; Bell tape recorder 3-speed model RT65B, RK4D92; Two Vibroplex and misc., items. Send for List. Jim Umstattd, W9CFV, 1318 N. Linden St., Bloomington, Ill.

WILL sacrific NC183 with speaker; Gonset 110 vac 6, 10-11, 15 meter converter with manuals; both in excellent condition for $200 f.o.b. Indianapolis, or make offer separately. All inquiries answered. R. B. Ricketts, W9AMV, 4232 No. Oxford, Indianapolis, Indiana.

SELL: Collins 310-C2 VFO, excellent, $95; BC 348 converted for 110v, very good, $45; BVL coils for 80, 40, 20, 10, with B & W shielded link, arm and base assembly, $11; BC-453 Q-5er, $12. W4RHD, 2320 Oleander Drive, Savannah, Georgia.

FOR Sale: RME HF 10-20 converter. Used very little. $45.00. Byron Fortner, W9FVM, RR#6, Box 370, Indianapolis 27, Ind.

NEARLY new 6E 10-20T Hy-Lite beams reasonable. R2, Box 180 Chanute, Kansas.

FOR Sale: Collins TCS-13 transmitter and Collins AC power supply complete with cables, remote unit, spare parts. Transmitter minus crystal sockets, also has one inch (1") hole in side of case, otherwise excellent condition. Rig presently on the air. Make offer. W4DBT, 1058 Bellefonte Street, Cocoa, Fla.

SELL: 21A midget teletype tape printer, $45; 12,000 ohm 110 v.d.c. relays d.p.d.t., $1.75; Collins 32V-1, $375; 32V-3, $595; Boehme keyer and tape perforator, $145; Dumont #241 scope, $275. Want: SIG-5 supply catalogs, technical manuals, ARN-7, APR-4 tuning units, ART-13 and parts, CU-25, BC-610, BC-614, BC-939. Will trade. Tom Howard, W1AFN, 46 Mt. Vernon St., Boston 8, Mass. Richmond 2-0916.

FOR Sale: SX71 Receiver with matching speaker, $175; S40A Receiver, $45; DB22A Preselector, $45. All in perfect condition. Come and hear them operate. Cash and Carry, prefer local sale. W2AXX, Howard Blower, 20 Sterling Place, Roosevelt, L. I., New York. Telephone Freeport 8-1475.

STANCOR 110CM, $25.00; new 813 with Johnson socket, $12.00; FM Pilotuner, $7.00. K2BIB, 307 Richardson Dr., N. Syracuse, N. Y.

32V1 factory converted to 32-V2, new condition; Drake low pass filter, $425; HRO-5, excellent condition, make offer. John Strubank, 4417 Bedford, Detroit 24, Mich.

PRINTED circuits: Make your own printed circuits. Kit includes materials and instructions. $2.95. Felix Dutko, 2078 Vyse Ave., Bronx, N. Y.

NEW SX88, best offer. New HT20, best offer. Postwar SX28A, like new, $145. Bob Denniston, Box 709, Newton, Iowa.

144-148.2 megacycle Gonset Model 9008 converter. Mobile or fixed. Brand new in carton. Best offer over $45. George Verven, 328 Terrell Ave., Forest Heights, Md.

CRYSTAL kit brand new holders and all parts for complete FT-243 crystals; includes free two semi finished and sized blanks for each holder. Packed in hinged lid metal box. Kit #1 — 25 holders, $2.49; Kit #2 — 50 holders, $4.49. Easco Communications Co., 2611 Goshen Ave., Elkhart, Indiana.

WANT: TR-4B; S-29; S-39; S-72; Astatic G stand; Eldico EE-2; Lampkin gear. Trade parts, tubes, rigs, books, GR-916A, etc. Howell, W4SOD, Lumberton, North Carolina.

EXTRA special, never used, Daven Potentiometers, 50,000 ohms, 12 steps, 5 decibels per step, ± 2%, $4.50 each; 3 units for $8.50. Dual Potentiometers, 125,000 ohms impedance each section, 20 steps, 2 decibels per step, 40 DB, total $5.00 each; 3 for $11.50. Postage extra. Laible Mfg. Co., 60 Park Pl., Newark, N. J.

SELL, trade: Panel power supply 500V/250ma, 400V/300ma, 250V/75ma, 300V regulated, filament, $40; speech amplifier, $12; amplifier, pair 807s, pi network, panel, $15; coils BEL 80-40-20, BVL 80-40, swinging link, untampered, most unused, $18. Want 250 watt modulation transformer (811A's). W4CHO, Lanett, Alabama.

MOBILE: Elmac A54 transmitter, Leece Neville alternator complete with regulator, rectifier and xmfr, Gonset Super Six and Motorola police cruiser receiver, PE103 dynamotor. Best offer over $200. All inquiries answered. Frank Schwartz, W4KFK, 204 6th Ave. No., Nashville 3, Tenn.

MILLEN 90800 exciter with full set of coils, tubes and instruction manual, $20.00; New 4D32 tube and socket, $15.00. Walter Kozacko, W1NS, 1711 Central Avenue, Needham, Mass.

EXTRAORDINARY sale or trade: Hallicrafters SX-28 with matching speaker, in storage for 7 years; best offer over $65.00. Millen R-9'er with 20 meter coil $14.00. Thordarson T-18P61 Transformer 4250 & 3750 volt C.T. at 300 MA, $14.00. New Thordarson 75 Watt Multi-Match Modulation Transformer $7.50. Broadcast Mike similar to Electro-Voice V-3, Jap Model VT-345A in beautiful plush case, a steal at $13.00. New Bendix Transmitter 80 c/s A 17.5 to 160 MC, $12.00. Have many meters nearly new at 50% discount. Want commercial frequency meter, 5" scope or commercial VTVM. Prices f.o.b. Arlington. W4HVT, Lt. Col. Guy M. Blencoe, 6055 22d Road North, Arlington, Virginia.

WANTED — Back copies of ARRL Handbooks prior to 1950. Wanted for personal collection that was destroyed by fire. Write including edition no., year and price to: W7EAA Tekoa, Wash.

NEW 4X150A and socket won at hamfest. Best offer or what do you have for trading? Frank Wertz, W0LKO, 1604 First Street, Rapid City, South Dakota.

FREE! Biggest list of ham bargains in the country. AM, SSB, RTTY, Mobile, etc. Write for your copy today. Dossett, 855 Burlington, Frankfort, Indiana.

FOR Sale — New Johnson "Match Box", $41.50 — 160-80-40 meter Command transmitters, MD-7 modulator, Twin rack, 117D mike. New 250TH tubes ($12.50); 829B-4E27 and other. 600D Dynamic Mike. Weston 5" panel meters — 0-25A a.c. meter #433, #785 Industrial Tester, National NFM 83. Miscellaneous items. Free list. W0ZOB, Box 273, Coleraine, Minn.

QSTs for sale: 1925 to 1953 complete. Each year bound in blue buckram with gold letters. $125.00. Art Ross, 923 Broad St., Shrewsbury, N. J.

MUST sell! Like new 32V-3 transmitter, $575; recently purchased HRO-60T receiver, speaker and calibrator, $450; RME-MC55 converter, $45; multiphase slicer and adapter, $55; TBS-50D transmitter with Harvey-Wells 6V/600V/200ma vibrator supply, $110; new SCR578 complete Gibson Girl outfit, $25; new T-126/ARC-5 two meter transmitter, $25; W1RMS, 198 Euclid Avenue, Waterbury 10, Conn.

811 R.F. Stage, enclosed in Alum. Cabinet consisting of 811 tube, socket, B & W inductance, shielded swinging link, B & W butterfly type variable condenser, Fil. xfrmr, Triplett type 327 0-to-500 plate mill. and type 327 0-to-100 grid mill., grid coil, grid coil tuning condenser, Sprague Hy-pass conds., coax. fittings and blocking cond., $20.00. Thord. multimatch driver xformer, type T20D83 500-line to class B, grids, $10.00. Five 872a, s-three new, $5.00 each. Two used few hours, $4.00 each. J. H. Robinson, W5BG, 522 Cumberland St., Dallas 3, Texas.

FL8 audio filters, 2 for $2.50 prepaid in U. S. FT154 shock mount for RC-48, $2.00 each. Triplett 5" oscilloscope, Model 1441 in new condition, $95.00. BC 348, separate RF gain control, "S" meter and power supply with matching cabinet, $65.00. Super Pro receiver with matching cabinet and heavy duty power supply, in perfect condition, $125.00. RA20 rectifier, $15.00. BC-638 VHF frequency meter, 465mc gear consisting of GFN-52 ADF transmitter and GFN46 ADT RF to IF converter. New BC 348N unconverted and T47/ART-13 with dynamotor. Kenneth M. Taylor, New Orleans, please send address. M. D. Haines, W5QCB, 1316 S. W. Military Drive, San Antonio, Texas.

DANGER High Voltage metal signs, 3" x 12", baked enamel, $1 ea. R. C. Lackner, W9WPT, 2029A Bradley, Chicago 18.

HALLICRAFTERS HT-18 VFO, excellent condition, $100.00 f.o.b. Worthington, O. W8LOL, 119 W. Stanton Ave., Worthington, Ohio

SALE: Federal FT-102 transmitter, $175; BC-221-AK, ACPS orgbook, $125; Hicock 620 tube tester, $60. W5KUZ, 1422 Woodland, West Monroe, La.

FOR Sale: Deluxe all-band 800/960 watt phone/c.w. transmitter. Professionally designed and constructed. Complete including VFO. Designed to minimize T.V.I. Asking $1000, cash and carry. For details: Harvey Pastan, 100 Kilsyth Rd., Brighton, Mass.

450 WATT transmitter identical as in 1948 handbook page 221, too big for me, experience is limited, never been used, will sell or trade for small job. W8HWH, Karl Pohanka, 1116 California N.W., Grand Rapids 4, Michigan

VHF 152A Converter A-1 condition, $15.00. Gonset communicator I, latest model, $150.00. Mercury 5 HP motor 1954 model, brand new, $155.00. Gonset VFO preamplifier for use with Gonset communicator, $55.00. Converted BC-522 transmitter w/power supply, panel mounted, ready to go on air, $45.00. E&F coils for HRO 50 T1 60 $14.00 each. Bill Harper, W9BWM, 4037 Eddy Street, Chicago 41, Illinois.

WANTED: Receiver for 80-10 meters with crystal filter S-meter and speaker. Will pay $50.00. K2ENO, Charles Nadler, 51-09 217 St., Bayside L. I. 64, N. Y.

PITTSBURGH, Pa.: Collins 32V3, Antenna relay, D104 mike all in A-1 condx: $595.00. Homestead 19047. Will not ship.

SX62: Price, $190.00. F.o.b. Tampa. Guaranteed like new and in excellent alignment. Complete with R-46 speaker. Crated for shipment. W4VM, Van Slyck, Rt. 6, Box 575, Tampa 4, Fla.

FOR Sale: Stancor ST202, all-band transmitter, complete with 40-80 BVL; like-new, $110.00. F.o.b. Flushing, L. I., N. Y. Morton Goldman, 152-50 Jewel Avenue, Flushing 67, L. I., N. Y.

FOR Sale: Heathkit electronic equipment; 0-9 oscilloscope; V-6 vacuum tube voltmeter; TS-3 sweep generator; SG-8 signal generator; AO-1 audio oscillator. All assembled and wired at less than cost of kits. James S. Crawshaw, 142 Otis Street, Hingham, Mass. Tel. Hingham 6-0020.

HQ-140-X for sale. Brand new, $200.00. Prefer personal pick-up. T. S. Kaszuba, W1ZQT, 99 Hellstrom Rd., East Haven, Conn.

SURPLUS: RG-8/U cable 100 ft. $5.95; 250 ft., $13.25; 500 ft. $25.00. New connectors, PL-259 and SO-239, 5 for $2.00; new oil-filled condensers, 600 WVDC, 2 mfd. 69¢, 4 mfd. 90¢, 7 mfd. 95¢, dual 8 mfd. $1.95, 1000 WVDC, 1 mfd, 69¢, 2 mfd 90¢, 4 mfd, $1.59, 8 mfd $3.25. AN/APS-13 420 MC transceiver with 17 tubes, $22.50. Postage extra. Request new bargain bulletin. Visit new store for thousands of unadvertised bargains. Wanted to purchase: Surplus radio equipment, Navy synchros. Lectronic Research Laboratories, 715-19 Arch St., Philadelphia 6, Penna.

1 Kw CW, 600 'phone, TVI-proof, all-bands, P-810s final, in 5 ft. cabinet, $285.00. Ewan, W8WGN, 1504 So. Clinton, Defiance, Ohio.

FOR Sale: New surplus tubes, 304TL, 4 for $15.00; 24G, 5 for $5.00, postpaid. Joe Merloni, W3ZDW, Rd. #2, Coraopolis, Penna.

BOUGHT house trailer, cleaning out. Hv power supplies, 36" Bud rack cabinet, pair Elmac 4-65As, Pr 813's, many parts and tubes. Write for complete list and price. Bargains. D. W. Langston, W4WVH, Middlebrook Trailer Ct., Rt. #1, Germantown, Maryland.

HAMS! Have your personal call letters made on black felt 7" x 19" pennant with gold lettering. Send $1.50 to Francine Sadlon, #2 Rock Spring Rd., West Orange, N. J.

75-foot tower, $150.00. Cleo Nesler, Rt. #3, Glidden, Iowa

SX28 receiver, $100; 813 CW home-built transmitter with power supply, best offer. Major Roy Kackley, Qtrs. 0-70 A, Ft. Belvoir, Va.

WANTED: 80 meter coils for National SW-3, W7JFU.

SELL: National NC183-D and spkr, $200. In excellent condx. Contact Gilbert R. Smith, 702 Cathedral St., Baltimore 1, Md. Phone Vernon 7-2432.

FOR Sale: Brand new ATD, 120 w. AM transmitter, remote band-switching with manual, $70; also 4-250A, 4-125 and 4E27. Cy Harris, W2NDR, 758 Princeton Rd., Franklin Sq., L. I., N. Y.

FOR Sale: Collins 310B, in gud condx, now in use. Highest cash offer takes it. L. M. Evans, Box 331, Paris, Texas.

FOR Sale: Practically new RCA tape recorder, less than 30 days old, two speed, 1800 ft. plastic tape, $135.00. W9LQI, Boyd, Ashton, Ill.

SELL: CQ magazines, Jan. 1945 to June 1951 complete run, also QSTs from 1936 to date. Best offer. 500 watts of audio also. Have gone SSB. Write for other items. W3QD, Rapp, 667 Montgomery Ave., Philadelphia 11, Penna.

COMMUNICATIONS Engineers and Technicians! Excellent salaries, minimum requirements. Engineer: Graduate with 3 years experience. Technician: 2 years school in communications and 5 years experience. Require installation, adjustment, and maintenance experience with communication receivers and associated terminal equipment. Also, men with similar experience with high-powered transmitters, antennas, transmission lines. Must be willing to travel in United States and overseas. Write: Page Communications Engineers, Inc., 710 Fourteenth St., N.W., Washington 5, D. C.

SELL: ART-13 transmitter, unmodified, in perfect condx, $200.00. Send money order. Will ship. Conde Felver, K17BDM/W3, Fallsington, Penna.

FOR Sale: 150-B Meissner transmitter with Meissner exciter unit and manual. Complete, $150.00. W1DBS, John Savonis, 11 Dwight Court, New Britain, Conn.

BASS reflex cabinet, less speaker. Walnut finish. A beautiful piece of furniture. Will send snapshot if requested. Want communications receiver. Clayton R. Gerst, 2674 West 25th, Cleveland 13, Ohio.

SELL: Dynamotor, 6 volts input, 425 volts 375 Ma. output, $16.00. Larabee, W9BDD, Chana, Ill.

SELL: PCA-2T-200 Panadaptor. As new, in carton with manual. $50.00. W2WHG, DePalma, 87-09 Santiago, Hollis 24, N. Y.

LYSCO Tuner needed. Will pay the lowest under $8.00. Tom Buchanan, #2 Corvallis, Oregon.

WANTED: 2 meter xmttr (cheap) for CD. WN1ZTZ, Mark Smith, N. Sylvan Rd., Westport, Conn.

FOR Sale: Heathkit AT-1 transmitter and AC-1 antenna coupler $40.00. J. S. Aldridge, 2766 Westgate, Concord, Calif., K6DEJ.

QSTS for sale — only 8 volumes left: 1933 through 1937 (Vols. 17 through 21), 1939 and 1940 (Vols. 23 and 24), 1944 (Vol. 28). Each year is bound in black buckram with gold letters. Low price per volume — special price on all eight. L. A. Morrow, W1VG, 90 Bentwood Rd., West Hartford 7, Conn.

Index of Advertisers

A Complete Amateur Station

IN *only* ONE CUBIC FOOT *with*

Harvey-WELLS BANDMASTERS

6 AMATEUR BANDS

BAND-SWITCHING

Factory built & tested

(NOT A KIT)

T-90

90 WATT TRANSMITTER

The midget with a MIGHTY PUNCH

$179.50*

Complete with tubes less power supply (NOT A KIT)

R-9

9 TUBE RECEIVER

DOUBLE CONVERSION

PACKED WITH PERFORMANCE

$149.50*

For 115 V. AC operation

TRANSMITTER FEATURES

1. TVI Suppressed
2. Complete band-switching: no plug-in coils
3. Complete Break-in Key or keying of multiplier stages only
4. VFO Tuning without carrier on
5. Cathode biased Exciter tubes and clamp tube control of Final Amplifier Screen Voltage
6. Initial tuning at reduced power
7. Three position excitation control
8. Antenna loading flexibility
9. Selector switch allows metering of PA Grid, PA Cathode and Modulator currents
10. Remote Break-in and Receiver muting provided by relay control
11. VFO voltage regulated and temperature compensated
12. Illuminated dial and meter
13. Crystal door on front panel
14. Filament Operation 6 or 12 volts AC/DC
15. Low average Modulator current
16. Built-in provision for either Carbon, Crystal or Dynamic microphone and push-to-talk

RECEIVER FEATURES

1. Double conversion on all bands
2. Three tuned circuits on each band, in R.F. section
3. All coils slug tuned, giving high "Q" circuits
4. Separate oscillator coils for each band (no spurious response)
5. Bandwidth: Four kilocycles wide at the 6 db point
6. Complete with tubes and built-in AC power supply. 6 or 12 volt DC power supply available.
7. Crystal filtering optional.
8. Approximately 6" of dial spread on all bands. Accurately calibrated
9. Rigid Steel construction. (Vibration-Proof)
10. 6¾" hgt. enables easy under dash mounting for mobile installation

Send for technical Bulletins **HW 456** *and* **HW 457**

*Prices subject to change without notice.

***Harvey*-WELLS ELECTRONICS, INC., SOUTHBRIDGE, MASS.**

we're trading high at ALLIED

why wait for that new receiver?

get the best deal select your new receiver and get the top trade-in on your old equipment

easiest terms only 10% down, or your trade-in as down payment

write us today and you'll see what we mean by "Trading High"

TAKE YOUR PICK FROM RECEIVERS LIKE THESE:

Collins 75A-3. Peak performance from 160 to 11/10 meters. Dual conversion plus 9 tuned circuits and 3 kc mechanical filter.
98 SX 028. Net . . . **$530.00**
97 SX 776. 10" speaker. Net **$20.00**

Hallicrafters S-85. NEW! 540 kc—34 mc in 4 ranges. Bandspread, RF amp., dual IF's, BFO with pitch control, ANL, tone control built-in speaker, etc.
98 SX 711. Net . . . **$119.95**

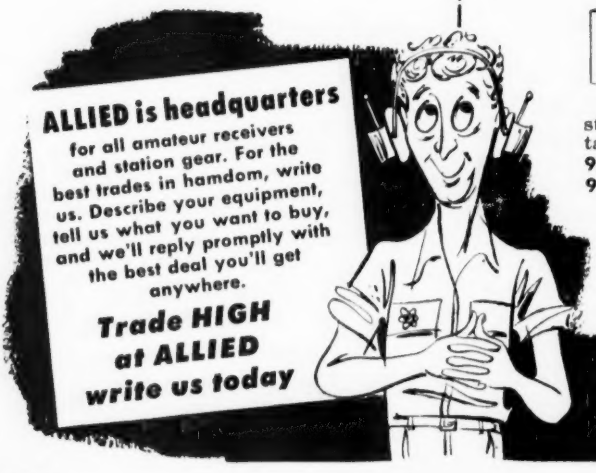
Hallicrafters SX-88. Dual conversion; 535 kc to 33.3 mc in 6 ranges. 2 RF stages, 50 kc second IF, crystal-controlled 2nd conv. osc.
98 SX 715. Net . . . **$595.00**
98 SX 716. 10" speaker. Net **$19.95**

Hammarlund HQ-140-X. 540—31 mc in 6 ranges. Crystal filter, ANL, 6 sel. positions, elect. bandspread, etc.
98 SX 766. Net. . . . **$264.50**
97 SX 757. 8" speaker. Net. **$14.50**

National NC-98. 550 kc—40 mc coverage. Crystal filter, S-meter, separate HF osc.
98 SX 732. Net **$149.95**
NC-98SW. As above, but with bandspread for 17, 19, 25, 31, 41 meter SW BC bands.
98 SX 720. Net **$149.95**
98 SX 722. Matching 6" speaker. Net **$11.00**

National NC-183D. Dual conversion; 540-31 mc and 47-55 mc in 5 ranges. 3 IF stages, 16 tuned circuits, 4.4-55 mc.
97 SX 666. Net **$399.50**
97 SX 663. 10" speaker. Net **$16.00**

National HRO-60. Dual conversion; 1.7-30 mc; bandspread on 80, 40, 20, 11-10 meters. 2 RF stages; ANL; S-meter, 6-step crystal filter, etc.
97 SX 722. Net **$533.50**
97 SX 721. 10" speaker. Net **$16.00**



ALLIED is headquarters for all amateur receivers and station gear. For the best trades in hamdom, write us. Describe your equipment, tell us what you want to buy, and we'll reply promptly with the best deal you'll get anywhere.

Trade HIGH at ALLIED write us today

FREE: Your 308-Page 1955 ALLIED Catalog. Get it—use it for the best deals in Ham Radio.

ALLIED RADIO
100 N. Western Ave.
Chicago 80, Illinois

PRINTED IN U.S.A.
RUMFORD PRESS
CONCORD, N.H.

hottest value in ham radio

The New NC-98

$149.95

Feature for feature, dollar for dollar, nothing on the market even comes close to the new NC-98! Compare and prove it! Complete with crystal filter and an S-meter at this modest price. No other offers this, plus these additional performance features:

550 kcs to 40 mcs range · calibrated amateur bandspread (or SWL bandspread for short-wave listening) · new miniature tubes · an RF stage · two IF stages · edge-lighted dial scales · noise limiter · separate high-frequency oscillator · 3-position selectivity · antenna trimmer · phasing control · sensitivity control · accessory socket ·

tuned to tomorrow **National** NC

the new **HORIZON** *in high fidelity*

Whether you're a hi-fi fan or not, you'll be called on as an expert to voice an opinion. We sincerely feel we have the finest line on the market and we'd like your recommendation. Won't you please write for complete specifications?

NATIONAL COMPANY, INC. 61 SHERMAN ST., MALDEN, MASS.

HIGH POWER

costs less . . . with RCA tubes

Highly regarded by radio amateurs for their high power output at moderate plate voltages, RCA-designed power types are the answer to real transmitter economy when you plan to raise your input. Here's how these types reduce transmitter construction costs:

1. *They do not require very-high-voltage plate supply transformers.*
2. *They reduce the need for extra high-voltage rating rf bypass and dc filter capacitors.*
3. *They minimize the need for heavy-duty, wide-spaced tuning capacitors.*
4. *They reduce rf and dc insulation problems —all the way through.*

Check table for the power you want and see how little plate voltage it takes to get it.

Your local RCA Tube Distributor can supply you with a complete line of RCA tubes for amateur use.

Get technical bulletin(s) from RCA, Commercial Engineering, Section K37M, Harrison, N. J.

Typical Power Input and Plate-Voltage Values for popular Class C Telegraphy

RCA No.	Type	DC Power Input (watts)	DC Plate Volts
810	High-perveance triode	500	2000
811A	High-perveance triode (High Mu)	520*	1500
812A	High-perveance triode (Low Mu)	520*	1500
813	Beam Power	500	2250
833A	High-perveance triode	1000	2250
8000	High-perveance triode	500	2000
8005	High-perveance triode	600*	1500

*Per two tubes

RCA RADIO CORPORATION of AMERICA
ELECTRON TUBES HARRISON, N. J.